January 1984
Vol. 10, No. 1
$2.95

Notebook Computers

creative computing®

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In-Depth Evaluations:

- Sharp PC-5000
- MicroOffice Road Runner
- Teleram T-3000
- Cromemco C-10SP
- Commander Keyboard
- Atari Games
- Word Processors For The Home

Choosing A Notebook Computer

Ratings of 14 Notebook Computers

Computing Taxes With VisiCalc

Deducting Your Computer

Mastering Jumpman

CBasic Clinic

Plotter Tutorial

High Precision Functions In Basic

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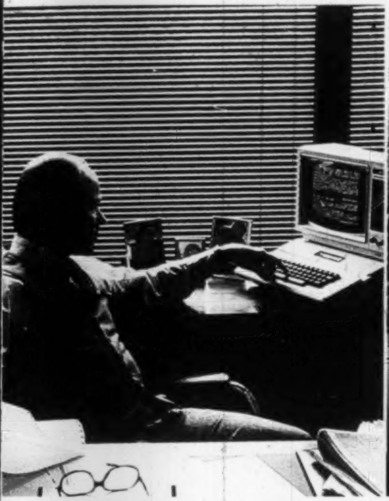
Hayes™ Your Apple's telephone.



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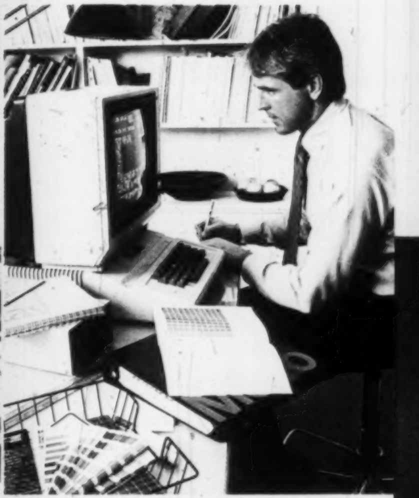

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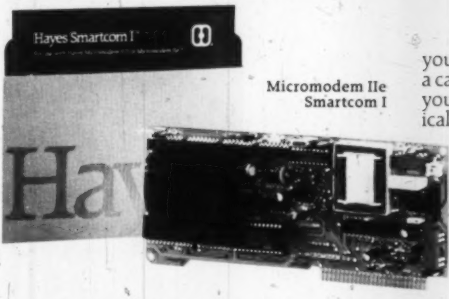

Micromodem IIe
Smartcom I

A complete plug-in communications system for Apple® computers. From Hayes, the established telecomputing leader: the simple but sophisticated Micromodem IIe® plug-in board modem and its companion software, Smartcom I.™ Everything you need to expand the world of your Apple II, IIe, II Plus and Apple III. In one, convenient communications package.

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Micromodem IIe. Think of it as your Apple's telephone. It allows your computer to communicate with any Bell-103 type modem over ordinary telephone lines, at 110 or 300 bits per second. Micromodem IIe installs easily in an expansion slot, and requires no outside power source. It connects directly to either a single or multiline modular phone jack, to perform both Touch-Tone® and pulse dialing.

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A built-in speaker lets you monitor your calls when dialing. That way, you'll know if a line is busy. With Smartcom I, Micromodem IIe automatically redials your last number.

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Smartcom I companion software. For effortless communications. Whether you're a newcomer to personal computing or a seasoned professional, you'll appreciate the ease and speed with which you can perform any communications function. Thanks to Smartcom I!

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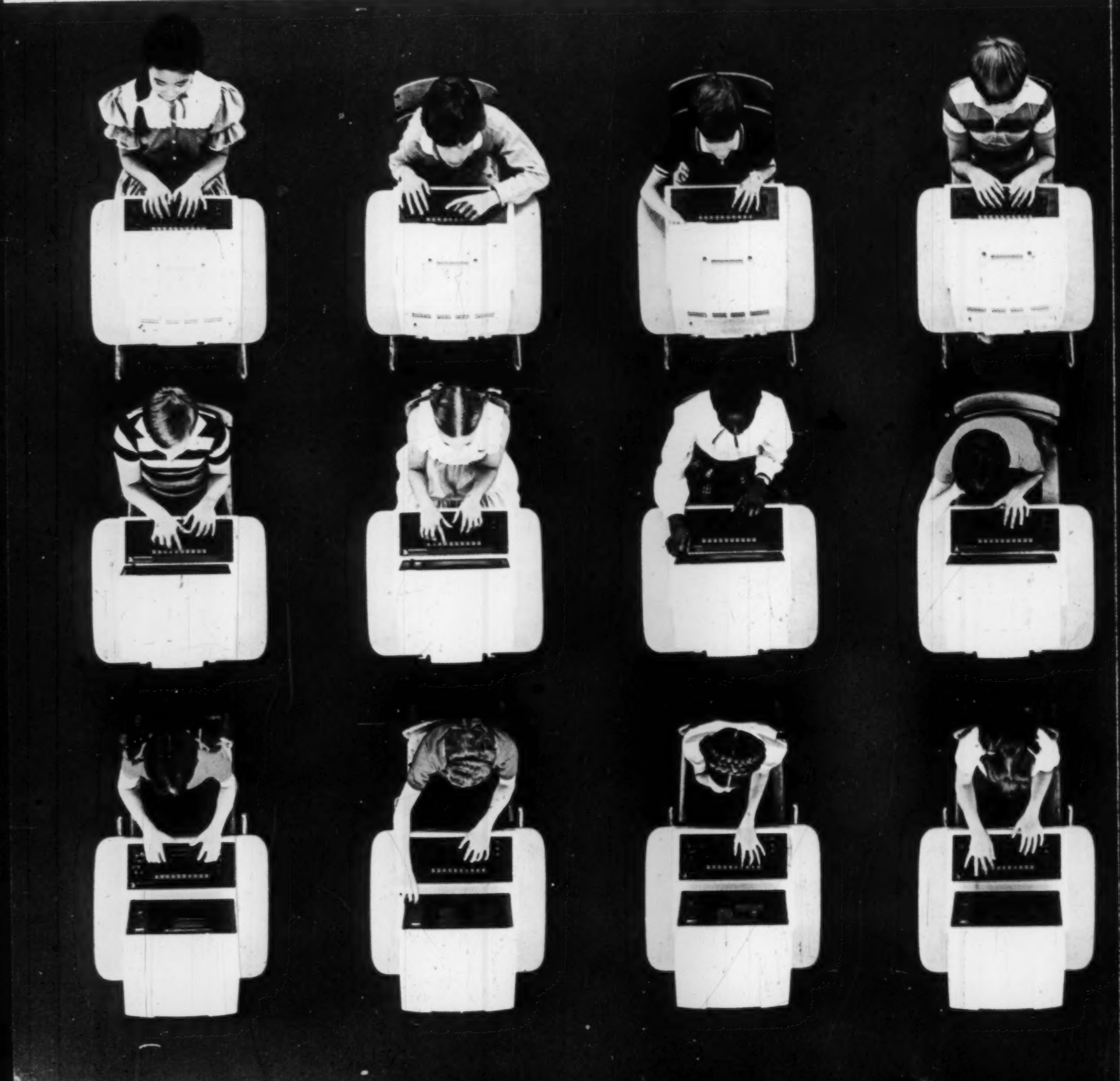
CIRCLE 161 ON READER SERVICE CARD

THE ONE COMPUTER TO HAVE WHEN YOU'RE HAVING MORE THAN ONE.



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ACORN COMPUTER

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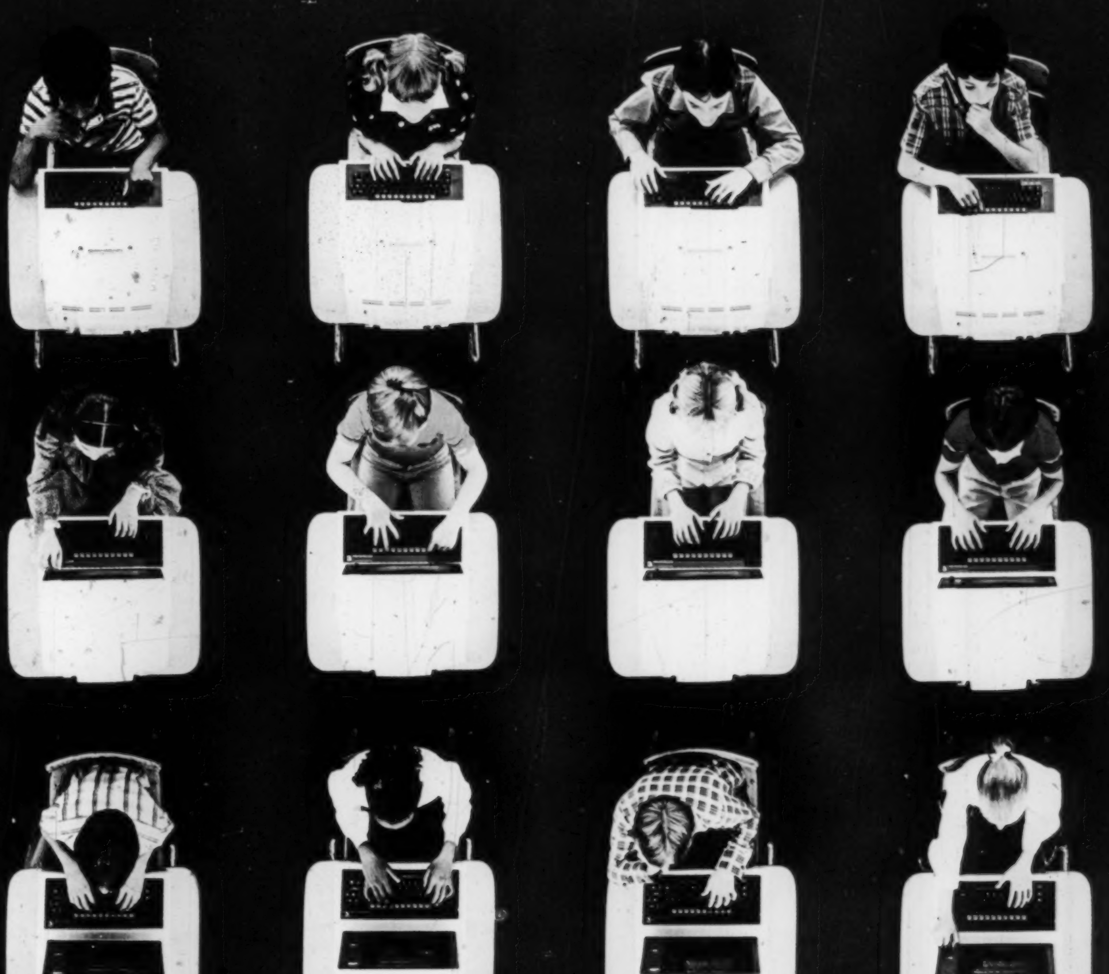

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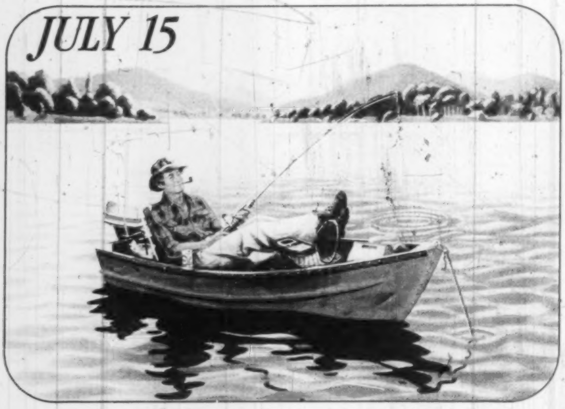
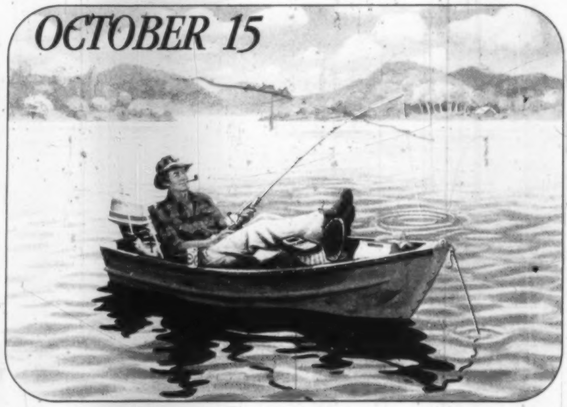
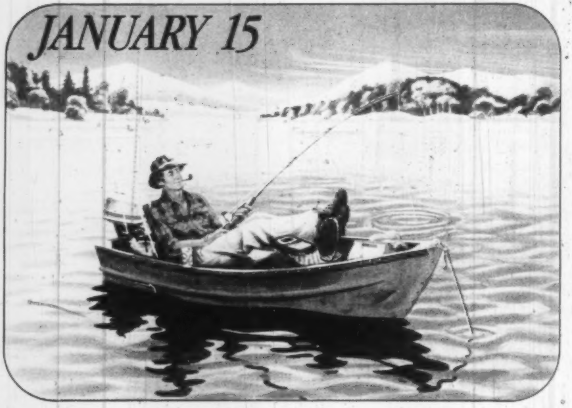
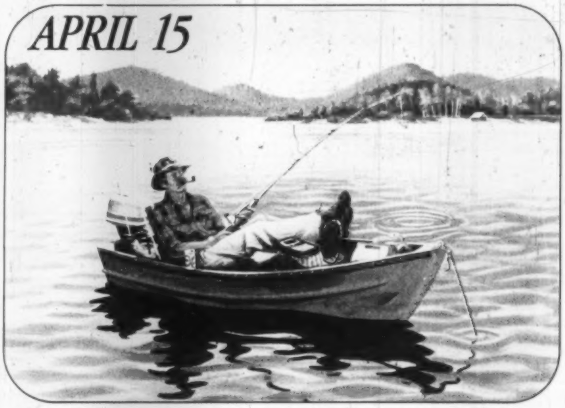
Make April 15th just another day. Get The Tax Advantage.™









April 15 doesn't have to throw you into a cold sweat anymore. Now you can sail through the task you've been dreading all year long. With **The Tax Advantage**.

This program is so easy, you'll be able to use it right away. Even if you've never done your taxes by yourself or used a computer before.

HERE'S HOW IT WORKS

The Tax Advantage takes you line-by-line through Form 1040 and the other most common tax forms. It asks you for information in plain English, and you type in the numbers. That's all there is to it.

The Tax Advantage automatically computes your taxes with each entry you make. So you know exactly how each line affects your overall tax picture. Additionally, **The Tax Advantage** does complex operations like income averaging with a few simple commands.

What's more, you can use these features to help plan what your tax would be if your income, deductions or other figures changed.

And each year, as tax laws change, you (as a registered owner) can get the newest version of **The Tax Advantage** at a special rate.

If you think **The Tax Advantage** sounds fantastic, you're right. But there's more.

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If you own **The Home Accountant**, the #1 best-selling home finance program, you can transfer your records to **The Tax Advantage** at tax time. It'll make doing your taxes even faster.

You'll be surprised how simply and efficiently you'll knock off the dreaded tax return.

So get **The Tax Advantage**.

And have a terrifically ordinary April 15.

The Tax Advantage is available for: Apple II/IIe, Atari 400/800, IBM PC/PC XT, Texas Instruments Professional and Commodore 64.

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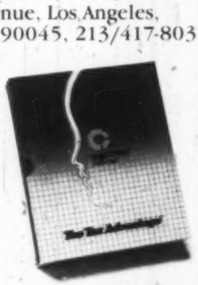

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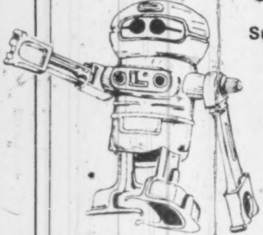

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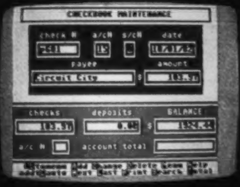
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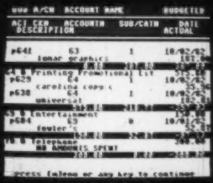
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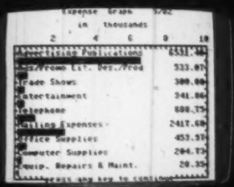
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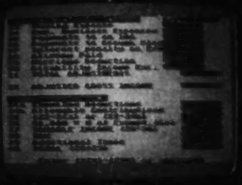

5

actual screen display   *indicates function being shown

Chart of Accounts
*Checkbook Maintenance
Check Search
Prints Checks

*Detail Budget Analysis
Summary Budget Analysis
Income/Expense Statements
Net Worth Statement

Appointments Calendar
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Street Price Index

The Creative Computing Street Price Index is an on-going monitor of the average price levels of selected computers, peripherals, video games and related accessories in the real-world marketplace. The list price is the price set by the manufacturer for the product when it was first announced, and is not necessarily the current manufacturer list price.

As time goes on, this Index will be presented in graphical form, but until there are six or seven data points, a graph would be of little value.

This Index is not intended to be a purchasing guide. Frequently, the lowest price for a computer will be offered by a vendor who is going out of business or closing out that particular item. Unless you are convinced you will never need service or are skillful enough to repair an unhealthy computer yourself, you would probably not want to buy a machine from such an outlet.

Furthermore, most of our price monitoring is done in major metropolitan areas on the two coasts. Prices outside of large cities and in the central part of the country are usually higher.

Computer	Orig List Price	Nov. 1983 ....Monthly....... High	Low	Average	Month Ago	Year Ago
Apple IIe (64K, 40-col)	1395	1395	1149	1260	1260	n/a
Atari 400, 16K	559	249	69(1)	159	164	352
Atari 800, 48K	999	549	199(1)	374	374	863
Atari 1200, 64K	899	679	249(1)	464	464	n/a
Commodore Vic-20	297	149	69	109	109	274
Commodore 64	599	399	179(1)	289	289	n/a
Osborne 1, 64K	1795	1795	975	1390	1440	1895
Radio Shack:						
Color Comp, 16K	399	199	159	179	199	399
Model 4, 64K	999	999	799	899	999	n/a
TI 99/4A, 16K	635	269	84(1)	167	167	299
Timex 1000, 2K	99	45	29	38	43	149
Average home computer (up to 16K)	398	208	87	142	143	295
Line Printer						
Epson FX-80	699	599	519	559	615	n/a
Epson MX-80FT	745	505	395	450	450	567
NEC PC-8023A	795	475	379	427	449	599
Okidata 82A	799	459	355	407	420	549
Okidata 92	699	599	449	524	524	n/a
Star Gemini 10	449	369	269	319	350	n/a
Average 80-col dot matrix printer	697	520	394	457	467	572
Video Games						
Atari 2600	199	99	55(1)	77	77	149
Atari 5200	269	200	118(1)	159	174	n/a
Colecovision	199	189	123	156	162	n/a
Intellivision II	199	150	69(1)	110	115	189
Average video game	216	145	91	118	127	169
Dynamic Memory Chips (200 ns, quantity 8)					...Lowest..	
16K x 1 bit (4116)	...	1.95	1.50	1.73	1.50	1.56
64K x 1 bit (4164)	...	7.49	5.75	6.62	5.95	n/a

(1) Includes a manufacturer rebate or equivalent

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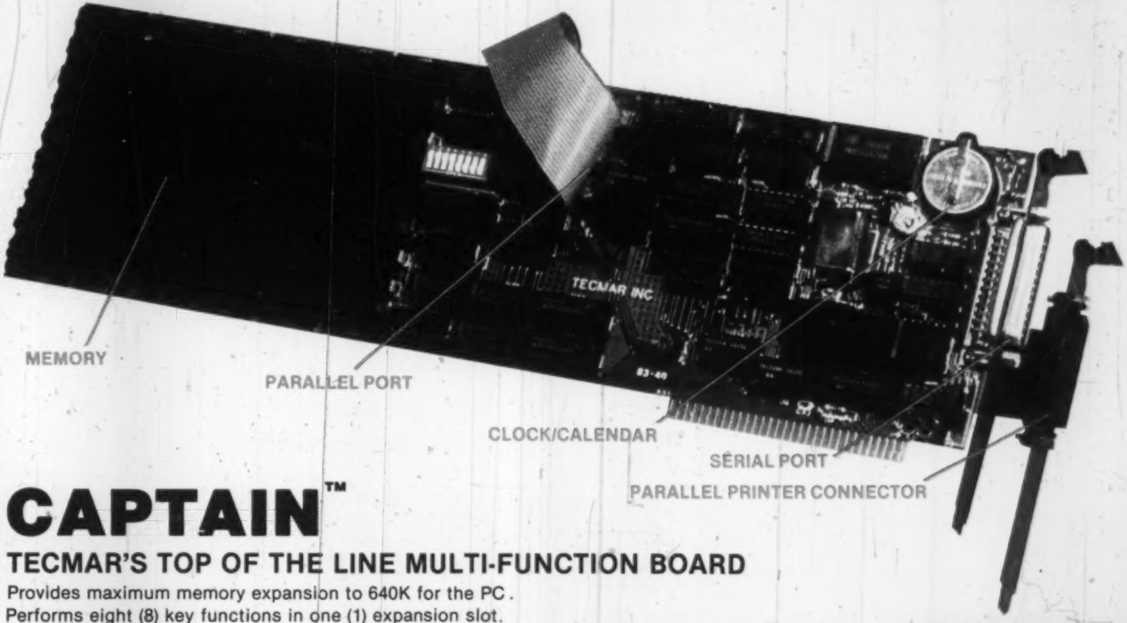

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- **PARALLEL PORT** - fully compatible for standard IBM Parallel Printer or compatible printers. Cable and connector included.
- **RAMSPOOLER SOFTWARE (included)** - enables printing to become a background task, freeing your PC for other functions.
- **SPEED DISK SOFTWARE (included)** - simulates high speed disk drive in RAM, from 5K to 512K in 1K increments. 50% faster than a Winchester.
- **AUTOTIME SOFTWARE (included)** - automatically enters correct date and time each time the user powers up the computer.
- **OPTION** - inexpensive PAL chip enables user to restrict availability of information on a 'need to know' basis or to limit access to proprietary software.

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$499/128K
$574/192K
$649/256K
$724/320K
$795/384K

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WAVE
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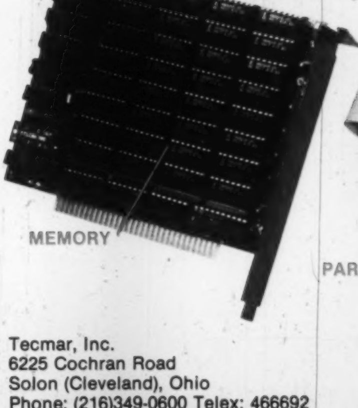
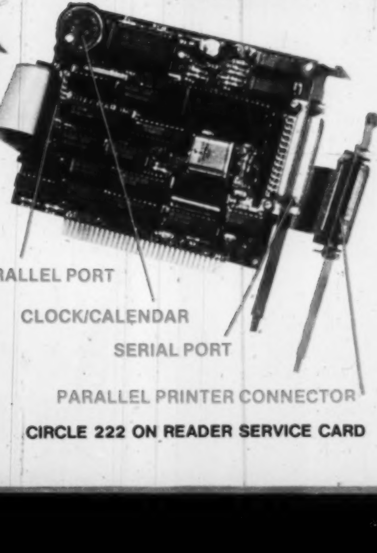


BOSUN
$195⁰⁰



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$379/ 128K	**$499/256K**

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The following additional features are the same as Captain described above:

- **RAMSpooler™ Software**
- **SpeedDisk™ Software**

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CIRCLE 222 ON READER SERVICE CARD

7 Years Ago

creative computing

Nov-Dec 1976
vol 2, no 6

the magazine of recreational and educational computing

$1.50

Frederik Pohl: A Day in the Life of Able Charlie

Beyond BASIC

Games: Poster, Two-to-Ten, LEM

Computer Sorting Techniques

Computer Literacy Quiz

Computers and Beauty

Equipment Reviews: Tektronix 4051, HP 25, Odyssey Game

Computer Stores

Luehrmann: Should the Computer Teach the Student or Vice Versa?

The November/December 1976 issue of *Creative Computing* was a milestone in many ways. First, it was our first "slick" issue after two years of publishing on groundwood (newsprint) stock.

Second, we printed the article, "A Comparison of Sorts" by John Grillo comparing the bubble, delayed replacement and Shell-Metzner sorting techniques. This has been the most reprinted article in our history, and has served as the basis for at least six follow up articles in *Creative Computing* and other magazines.

Third, we ran an article by Jim Dunion titled, "A Retail Computer Store? You Gotta Be Kidding." This was an article about the first few computer stores in the country, and we (and they) weren't kidding. Jim, incidentally, went on to produce the amazing computer exhibits at the American Museum of Science and Energy in Oak Ridge and, more recently, joined Atari.

Fourth, we printed two now-classic articles in the area of computers in education. The first was Arthur Luehrmann's "Should the Computer Teach the Student, or Vice-versa?" It concluded that that it would not be much longer that a computer illiterate would be considered an educated person. The second was David Moursund's "What Is Computer Literacy?" which included a related computer literacy quiz. It is current to this day.

We also had articles on computer art, building an Altair 8800, assemblers and machine language, the heapsort technique, and marvelous stories by two masters of science fiction, Frederick Pohl and Charles Mossmann. There were three games, several puzzles and problems, and four equipment reviews (including one of the Odyssey I video game and the Great Wall 203, an electronic calculator from China).

Since this was our first slick issue, we didn't have a great deal of advertising. We had ads for the Altair 680 (kit with 1K memory, $466), Southwest Tech 6800 (kit with 2K, $395), Cromemco TV Dazzler (kit for S100 systems, $215), books from several publishers, and careers at NCR.

This was our second anniversary issue and we put a great deal of effort into it. Now, seven years later with 20-20 hindsight, we can say definitively it was one of the most successful issues in the history of *Creative Computing*. —DHA

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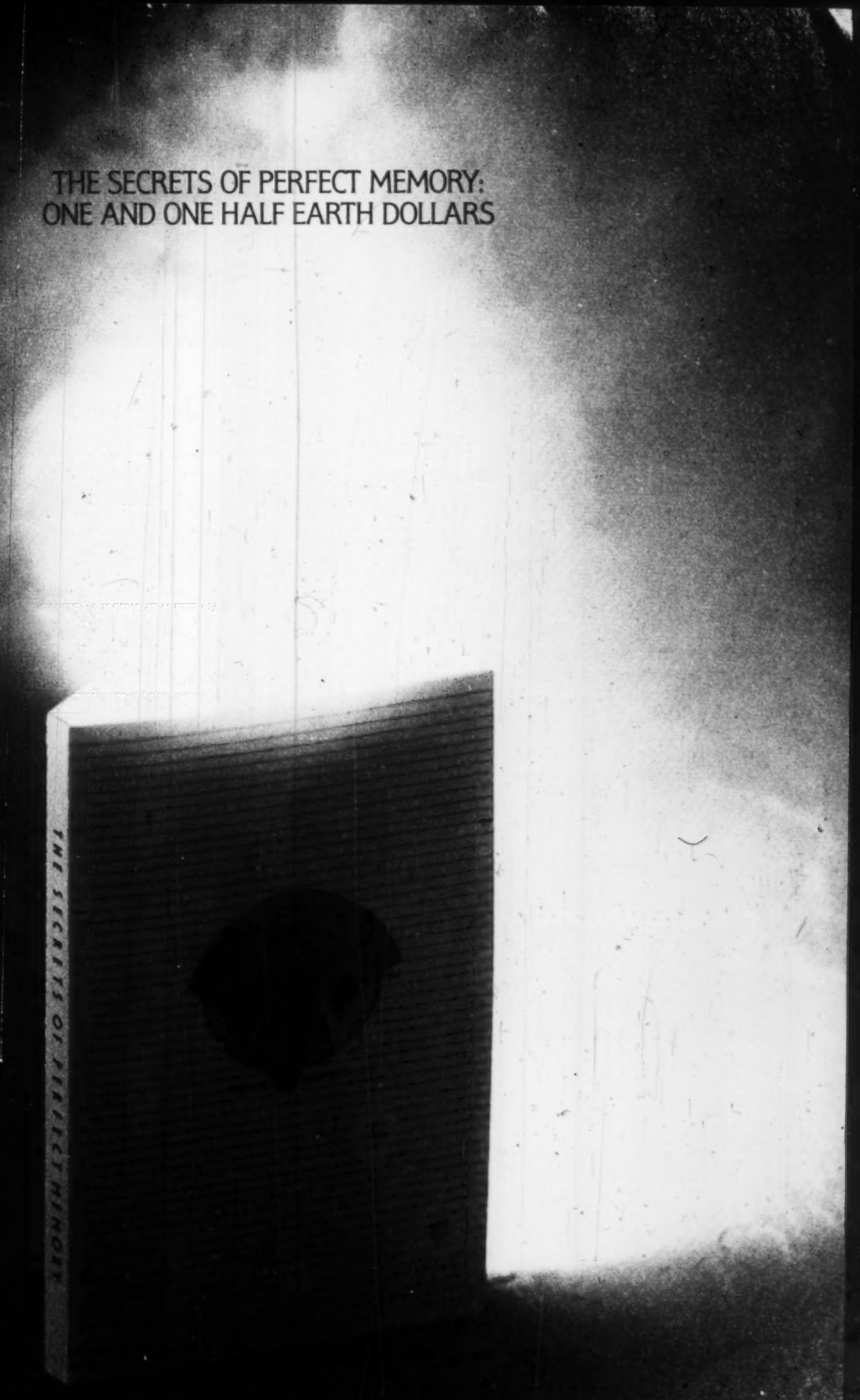

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CIRCLE 190 ON READER SERVICE CARD

Notices

Creative Computing On CompuServe

Creative Computing now has a SIG (Special Interest Group) on the CompuServe Information Service. This SIG features a download section of popular programs from the magazine and program fixes and enhancements. Members are invited to submit programs and fixes of their own. Also featured is a bulletin board area for readers' questions to the *Creative Computing* staff and their answers. A conference section allows SIG members to participate in a multi-person discussion with editors and guests of *Creative Computing.*

A special feature is the "Street Price Index," a comparison of high and low equipment prices gathered from dealers in different areas of the country, authored by David Ahl, our editor-in-chief.

Membership is free to all CompuServe subscribers.

No Connection

The marks depicted with the review of the *Electric Webster* program in the November 1983 issue are the trademarks of Merriam-Webster Inc., publisher of *Webster's Third New International Dictionary of the English Language, Unabridged*, and neither *Electric Webster* nor its manufacturer is associated with, sponsored by, or approved by Merriam-Webster, Inc.

Call For Papers

The Instructional Resource Center of the City University of New York announces a national conference on Microcomputers and Basic Skills in College to be held April 13-15, 1984.

Papers on the use of microcomputers in postsecondary basic skills instruction in the folllowing areas are invited: writing, English as a second language, reading, speech, mathematics (arithmetic through precalculus), other areas of developmental education.

Send abstracts and address inquiries to: Prof. Geoffrey Akst, Instructional Resource Center, The City University of New York, 535 East 80th St., New York, NY 10021. (212) 794-5425.

The International Computer Problem Solving Contest

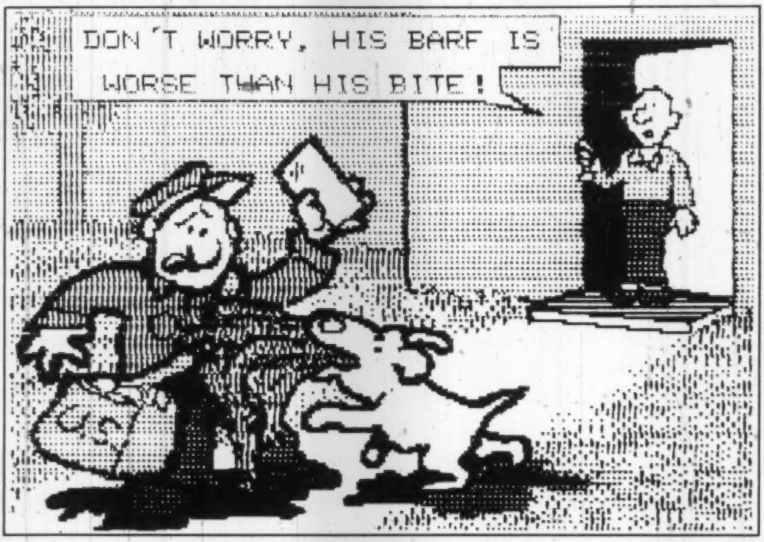
Since 1981, the University of Wisconsin-Parkside has invited pre-college students all over the world to participate in a computer problem solving contest. This contest is an extension of a competition held locally at the university since 1977. The idea of the contest is simple: teams, made up of one to three students using one terminal or microcomputer, attempt to solve five problems within a two-hour time period. At the end of this period, the programs and required sample runs are listed out to a printer and handed over to the local judges.

If a team solves four or five problems correctly, the local contest director can forward the programs to the University of Wisconsin-Parkside for international comparison and ranking. Any local recognition for the top teams is left to the discretion of the local contest director.

This contest is primarily a local event. Any adult may become a contest director and establish a contest site in his area. The University of Wisconsin-Parkside supplies the problems, sample solutions, rules, score cards, result forms, and previous contest problems.

The Fourth International Computer Problem Solving Contest will be held on Saturday, April 28, 1984. Friday, April 27 is the alternate date for contest sites that cannot hold the contest on Saturday.

For registration forms and further information, contact Dr. D.T. Piele, Box 2000, University of Wisconsin-Parkside, Kenosha, WI 53141.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Creative Computing Benchmark

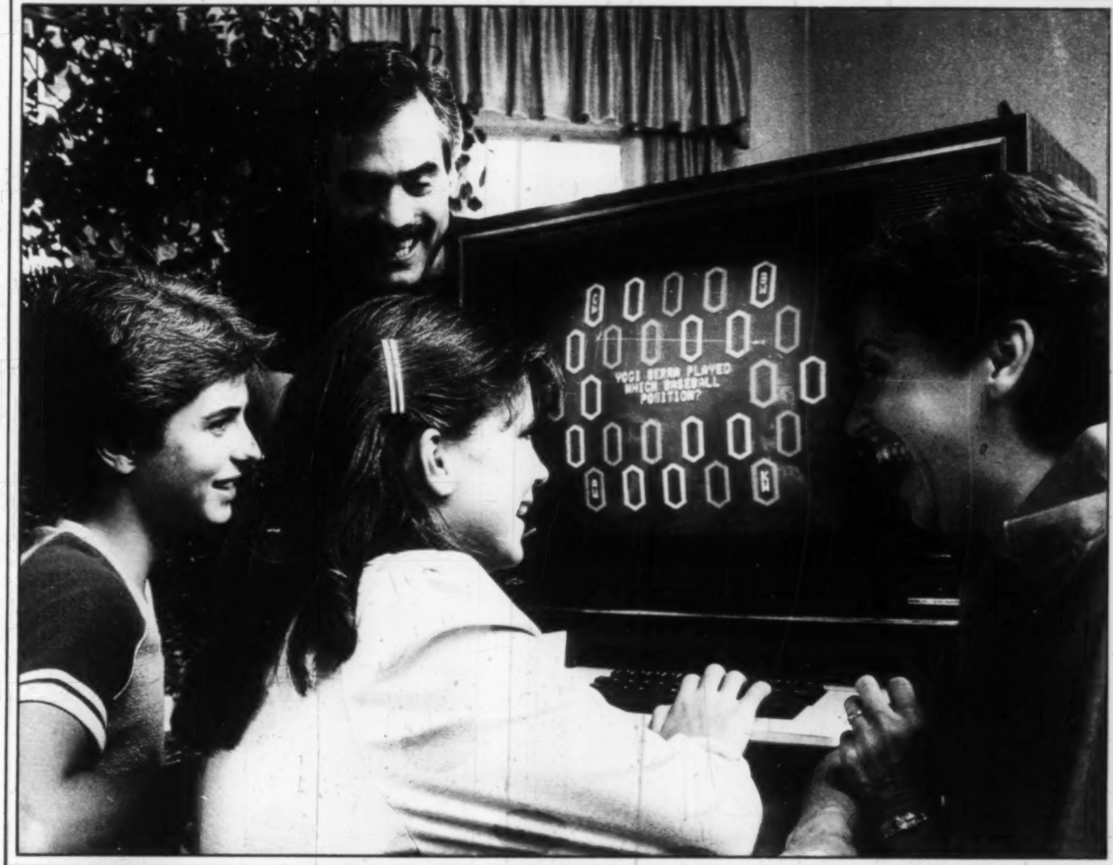
The Creative Computing benchmark is a short test of computational speed, accuracy, and the random number generator in Basic. Computers in the chart are listed in ascending order of completion time of the test expressed in minutes and seconds. In the accuracy measure, the smaller the number the better (.0000001 is excellent while .187805 is poor). In the randomness measure, smaller is better (numbers under 15 are good and over 15 are fair).

Since running the short article about the benchmark test, we have been overwhelmed with responses from readers who ran the test on machines not listed in our original table. With letters still pouring in, here are the results for 107 different computers.

We have taken note of the criticisms of this simple test and are in the process of devising a more comprehensive one. Watch for a follow-up article.—DHA END

```
10 ' Ahl's Simple Benchmark
20 FOR N=1 TO 100: A=N
30 FOR I=1 TO 10
40 A=SQR(A): R=R+RND(1)
50 NEXT I
60 FOR I=1 TO 10
70 A=A^2: R=R+RND(1)
80 NEXT I
90 S=S+A: NEXT N
100 PRINT ABS(1010-S/5)
110 PRINT ABS(1000-R)
```

Computer	Time	Accuracy	Random
DEC VAX 11/780	0:01	.0113525	5.3
DEC VAX 11/780 (double)	0:015	.00000000163283	5.3
HP 9845B (390 bit slice)	0:03	.00000882	23.1
Control Data Cyber 730	0:03	.00000000355	6.1
Amdahl 470	0:04	.00000000011846	12.4
HP 3000 Series 44	0:04	.112549	12.9
HP 9836	0:05	.00000000127329	5.5
Wang 2200 SVP	0:05	.000000076	3.9
Stearns Micro	0:08	.005859375	7.1
Burroughs B20	0:09	.00593874454977	3.2
Alpha Micro AM 100T	0:10	.00000387337	12.4
Burroughs B22	0:12	.005859375	15.7
NEC Adv Pers Comp	0:12	.005859375	7.2
Tektronix 4054	0:12	.00000014042598	8.5
Olivetti M20	0:13	.0114136	6.2
Saybrook 68000 (in Apple)	0:13	.0000000011	10.4
TI Professional	0:15	.005859375	7.1
Compaq	0:15	.005859375	7.1
HP 9845B	0:15	.00000882	23.1
Zenith Z-100 (8088)	0:17	.005859375	9.7
ACT Apricot	0:18	.005859375	7.2
Sharp PC-5000	0:18	.005859375	7.2
Eagle PC-2	0:19	.005859375	7.2
DEC Rainbow 100	0:20	.005859375	7.2
Acorn BBC Computer	0:21	.000128746033	5.2
Columbia MPC	0:21	.005859375	7.2
Computer Devices DOT	0:22	.005859375	7.1
IBM PC	0:24	.01159668	6.3
GCE Vectrex	0:33	.0753174	0.9
TI DS990/12 (Mini TS)	0:36	.000000388	3.1
Laser 2001	0:40	.0003272295	17.4
Memotech MX-512	0:46	.00025296212	6.9
HP 9020C	0:48	.00000000127329	23.2
Lobo Max-80	0:48	.0338745	5.8
Lynx	0:51	.155	14.1
TRS-80 Model 4	0:53	.0670776	6.5
Panasonic JR200	0:57	.00021481514	15.1
SCS 100	0:59	.187805	7.4
IMS 8000	0:59	.187805	9.6
Alspa ACI-1	0:59	.187805	7.4
DECmate II	0:59	.187805	7.4
Xerox 820-II	0:59	.187805	7.4
Vector Graphic 3 VIP	1:04	.0338745	7.5
Zenith Z-100 (8085)	1:04	.187805	9.5
Toshiba T100	1:09	.187805	7.4
Epson QX-10	1:09	.187805	7.4
Osborne 01	1:10	.187805	7.4
Mattel Aquarius	1:17	.187805	10.0
Epson QX-10	1:18	.187805	7.4
HP-85A	1:20	.00000002	5.8
Morrow MD3 (Bazic 10)	1:21	.000473	3.6
HP-86A	1:25	.00000002	5.8
Tektronix 4051	1:26	.00000014042598	8.1
Digital Group Bytemaster	1:27	.000002779	3.6
NEC PC-8001A	1:29	.0338745	3.0
Atari 800 (MBasic)	1:35	.150879	2.1
Kaypro II	1:36	.187805	7.5
Sony SMC-70	1:37	.0000000458	3.8
HP-75C	1:38	.00000002	5.8
North Star Horizon(10 dig)	1:41	.000473	3.6
NEC PC-8201	1:44	.187805	9.3
MicroOffice RoadRunner	1:48	.187805	7.4
Teleram 3000	1:48	.187805	7.4
Apple III	1:48	.011914	6.7
Vic 20	1:49	.0010414235	23.7
HP 9830B	1:52	.00000889	13.1
Commodore 64	1:53	.0010414235	8.9
Apple II plus	1:53	.0010414235	12.0
Apple IIe	1:53	.0010414235	12.0
NEC PC-8801A	1:54	.187805	7.4
Rockwell Aim 65	1:56	.00104141235	14.7
Compucolor II	1:57	.0338745	1.4
TRS-80 Model III	1:59	.0338745	5.8
Micro Color Computer	1:59	.000596284867	7.6
Commodore CBM 8032, 2001	2:01	.0010414235	1.4
Heath/Zenith H-89A	2:04	.187805	7.4
Atari 2600 Graduate	2:15	.000224679708	7.9
TRS-80 Model I	2:19	.0338745	12.0
Color Computer	2:23	.000596284867	7.3
Atari 800 (fastchip)	2:23	.006875	7.0
Dragon 32	2:29	.000596284867	7.3
Epson HX-20	2:36	.0338745	23.8
Timex/Sinclair 1000 (fast)	2:43	.00041294098	8.7
Interact Model R	2:50	.0338745	8.1
Wang 2210	2:52	.000011432	12.5
OSI Challenger 1	3:07	.0010414235	13.9
SpectraVideo 318/328	3:40	.0000002058	0.7
TI 99/4A	3:46	.00000011	2.6
Radio Shack PC-3	4:00	.00000627	10.9
TI 99/4A, Extended	4:10	.00000011	10.7
Oric-1	4:10	.00104141235	12.1
Datapoint 1800	4:16	.0000012042	11.3
Sinclair ZX81	4:23	.0006685257	6.3
Sinclair Spectrum	4:39	.0006685257	3.5
TRS-80 Model 100	4:54	.0000002058	0.7
Casio FP-200	5:05	.00723	30.3
Sharp PC-1500 (RS PC-2)	5:10	.0000288	7.8
TI CC-40	5:41	.00000011	6.2
Sanyo PHC-25	5:41	.000267505646	10.2
Canon X-07	6:03	.0000002058	24.9
Atari 1200XL	6:45	.013959	5.2
Atari 400/800	6:48	.012959	22.8
Sharp PC-1250	11:14	.0000288	5.9
Timex/Sinclair 1000(slow)	16:55	.00041294098	7.4
IBM System 23	19:00	.0000005503	3.4
HP-97	23:00	.000034	---
Sharp PC-1211	28:32	.00002882	---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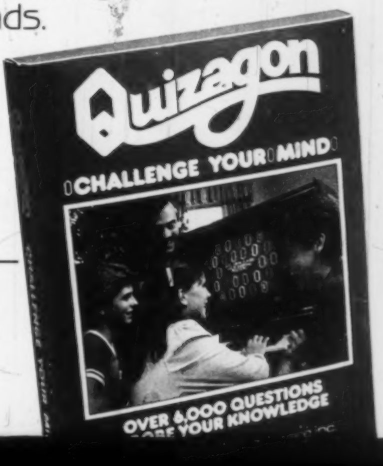
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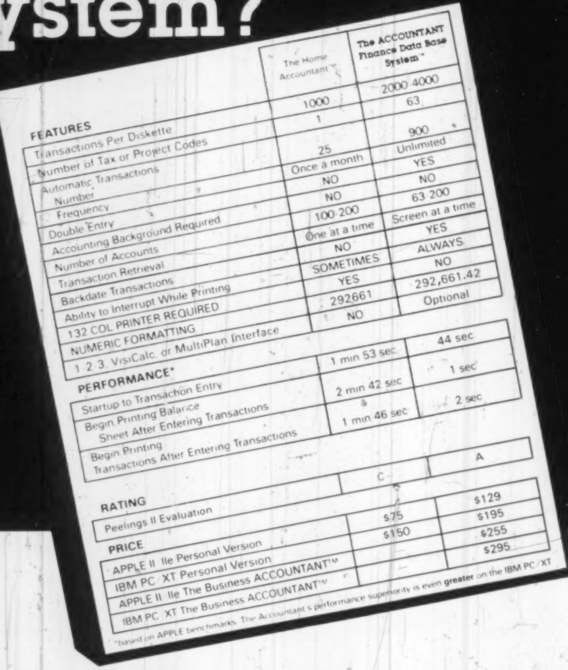

FEATURES	The Home Accountant™	The ACCOUNTANT Finance Data Base System™
Transactions Per Diskette	1000	2000-4000
Number of Tax or Project Codes	1	63
Automatic Transactions		
Number	25	900
Frequency	Once a month	Unlimited
Double Entry	NO	YES
Accounting Background Required	NO	NO
Number of Accounts	100-200	63-200
Transaction Retrieval	One at a time	Screen at a time
Backdate Transactions	NO	YES
Ability to Interrupt While Printing	SOMETIMES	ALWAYS
132 COL PRINTER REQUIRED	YES	NO
NUMERIC FORMATTING	292661	292,661.42
1-2-3, VisiCalc, or MultiPlan Interface	NO	Optional
PERFORMANCE*		
Startup to Transaction Entry	1 min 53 sec	44 sec
Begin Printing Balance Sheet After Entering Transactions	2 min 42 sec	1 sec
Begin Printing Transactions After Entering Transactions	1 min 46 sec	2 sec
RATING		
Peelings II Evaluation	C	A
PRICE		
APPLE II, IIe Personal Version	$75	$129
IBM PC/XT Personal Version	$150	$195
APPLE II, IIe The Business ACCOUNTANT™	—	$255
IBM PC/XT The Business ACCOUNTANT™		$295

*based on APPLE benchmarks. The Accountant's performance superiority is even **greater** on the IBM PC/XT

. . . . Here is what one of our users, a Washington D.C. channel 4 newscaster wrote to Softalk

As a computer novice and accounting illiterate, I set out to make a home finance program my first major software purchase. I fear *Softalk's* Fastalk column led me astray.

The Home Accountant is called "thorough and powerful." *The Accountant* is more expensive and gets modest descriptions like "simple-to-use" and "a sleeper." The choice should be obvious.

In fact, I believe *The Accountant* (the more expensive program) is so far superior as to justify the cost. It gives the user credit for brains but will handhold you through a remarkably effective double-entry system. That part might scare people off. In fact, it makes this program more enjoyable, as well as being educational and practical, but not more difficult. The documentation and tutorial are excellent, and Decision Support Software gives excellent user support.

Henry Tenenbaum, Washington, DC

The ACCOUNTANT
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CIRCLE 147 ON READER SERVICE CARD

creative computing software evaluation

creative computing equipment evaluation

A Note To Our Readers

Product evaluations in *Creative Computing* are different from those in many other magazines. Here's why.

A *Creative Computing* product evaluation is objective, thorough, and in-depth. Normally, we get an actual production product for testing—on loan or purchased from the manufacturer. We do not ask for or accept any special treatment, but interact with the manufacturer as a normal customer would.

In most cases, we test the product in the environment and under the conditions in which we would expect it to be used. We do not believe that we should sit in an ivory tower and pass judgment on a product that is meant to be used by a salesman on the road or a child in a classsroom.

When we evaluate a prototype, we state that fact in the review. Even so, we do not simply recite the manufacturer specifications; instead, we use the product, apply our own tests, and report on the results. If it lives up to the published specs, fine; if not, we tell you.

In our evaluations, we call a spade a spade and a lemon a lemon. Advertisers do not receive special treatment—no one does. Some manufacturers do not like this policy and refuse to work with us or advertise in the magazine. But most manufacturers welcome our policy of scrupulous honesty, and for that, we applaud them.

Nevertheless, we are not right all of the time. Sometimes, a unit might perform well in our tests, but be a dog for you. For that, we are sorry. But for the most part, we trust you will find our reviews—and the rest of the magazine—credible, honest, and interesting. END

See jane™ run

Once there was a time,

before the written word, when people used pictures to communicate. Symbols representing entire ideas were easy to see and understand. And the people were comfortable with this language. And they were happy.

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Jane is now available for the Apple][,][+ (64K), //e, Commodore 64. Available soon for the new Atari™ series and the IBM PC™ and compatibles. Apple™, Commodore™, IBM™ and Atari™ are all registered trademarks.

CIRCLE 110 ON READER SERVICE CARD

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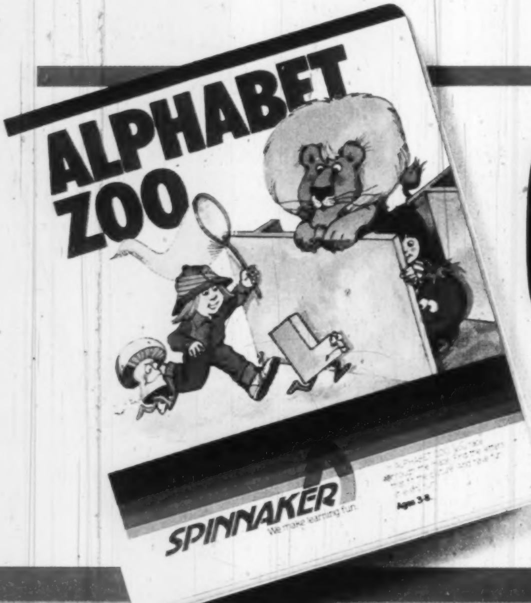
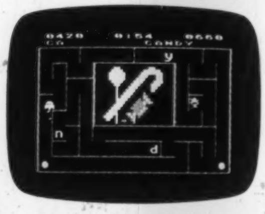
Watching your kids grow up is a lot of fun. But making sure their minds grow as fast as their bodies is even more rewarding. That's where we can help. With a growing line of Early Learning Programs that are not only lots of fun to play, but also educational.

Some of the games you see on these two pages help exercise your child's creativity. Others help improve vocabulary and spelling skills. While others improve your child's writing and reading abilities. And all of them help your child understand how to use the computer.

So if you're looking for computer programs that do more than just "babysit" for your kids, read on. You'll find that our Early Learning Programs are not only compatible with **Apple,® Atari,® IBM®** and **Commodore 64™** computers, but also with kids who like to have fun.



A trip through ALPHABET ZOO™ Ages 3-8



It's a race. It's a chase. It's Alphabet Zoo, the exciting game that will have your kids zipping through the maze, after letters that fit the picture on the screen.

And at the same time, your kids will be learning the relationship of letters and sounds, and sharpening their spelling skills. So they'll be laughing and learning at every turn.

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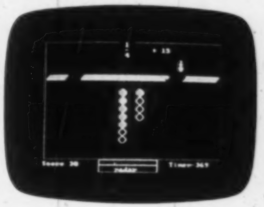
FRACTION FEVER
SPINNAKER

FRACTION FEVER™ brings fractions into play. Ages 7 to Adult.



FRACTION FEVER is a fast-paced arcade game that challenges a child's understanding of fractions. As kids race across the screen in search of the assigned fraction, they're actually developing a basic understanding of what a fraction is and of relationships between fractions. They're even discovering that the same fraction may be written in a number of different ways.

All in all, FRACTION FEVER encourages kids to learn as much as they can about fractions – just for the fun of it!

KINDERCOMP.™ Numbers, shapes, letters, words and drawings make fun. Ages 3 to 8.

KINDERCOMP is a game that allows very young children to start learning on the computer. It's a collection of learning exercises that ask your children to match shapes and letters, write their names, draw pictures, or fill in missing numbers. And KINDERCOMP will delight kids with colorful rewards, as the screen comes to life when correct answers are given.

As a parent, you can enjoy the fact that your children are having fun while improving their reading readiness and counting skills.

KINDER COMP
SPINNAKER

DELTA DRAWING
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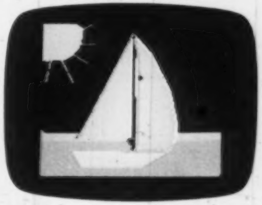
DELTA DRAWING.™ Have fun creating pictures and computer programs. Ages 4-Adult.



Kids love to draw. And DELTA DRAWING Learning Program lets them enjoy creative drawing and coloring while they learn computer programming concepts. As they use simple commands to put lines and colors in their drawings, they're actually writing computer programs!

With DELTA DRAWING, even kids who have never used a computer before can learn to do simple programming and build an understanding of procedural thinking. It's easy, clear, and lots of fun!

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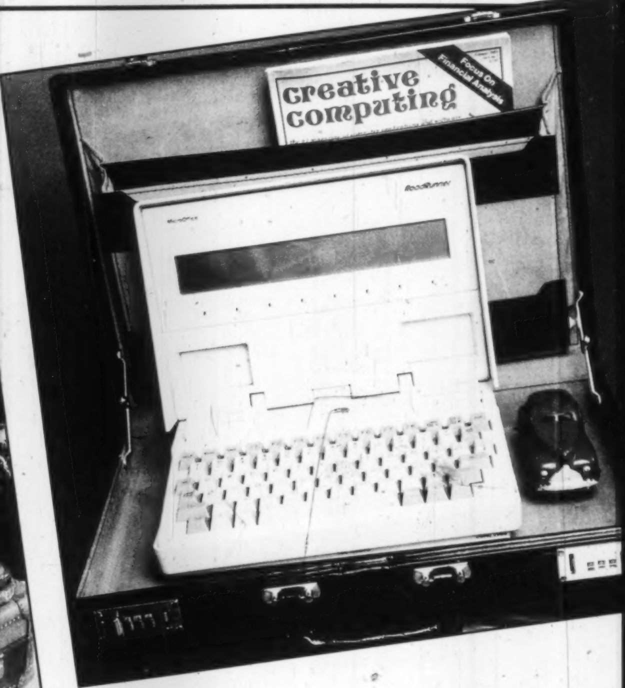
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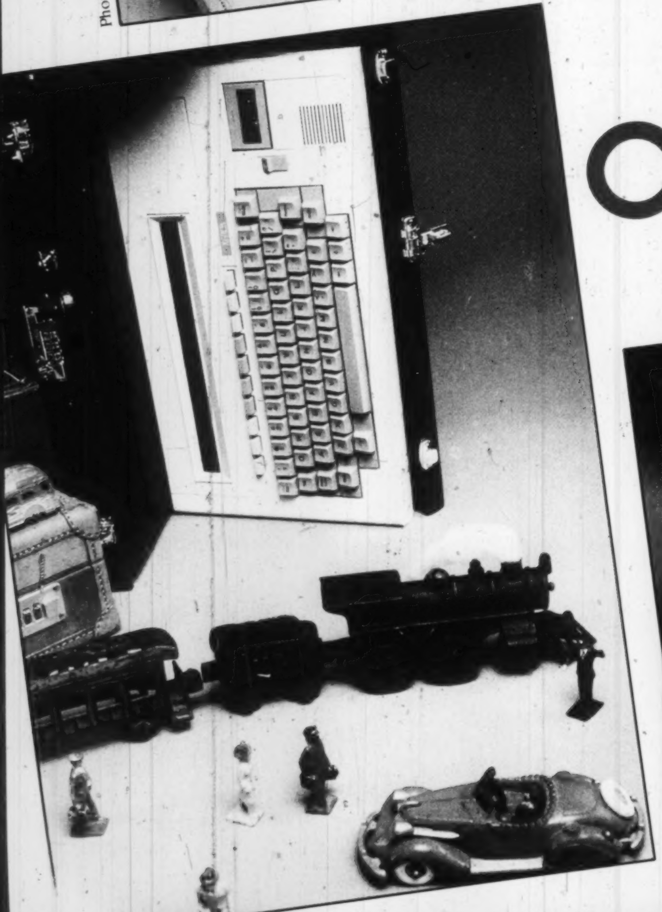
CHOOSING A

David H. Ahl



NOTEBOOK COMPUTER

Eight years ago, several of us paid a visit to Alan Kay at the Xerox Palo Alto Research Center (PARC). Late in the afternoon, the mood was given over to blue-sky dreaming, kind of a "wouldn't it be nice if. . ." session. One dream that seemed to be shared by everyone in the group, managers, researchers, and educators alike was that it would be wonderful to have a truly portable computer about the size of a three-ring binder with computational, word processing, and color graphics capability at an affordable price.

Today, except for the color graphics capability, such a machine is here. And it probably won't be too long until the graphics are available too.

Such a computer is not necessarily for everyone, but it is far easier to name people who could make good use of such a machine than those who could not. Anyone who works with numbers knows the benefits of a computer or programmable calculator. Most writers are switching to word processing systems in the home office. Now even the field notebook and pocket tape recorder can be replaced.

But notebook computers will find application with scores of people who have never touched a computer before—sales people making presentations to clients, business people at a branch office, students in the library, scorers at athletic games, and just plain folks who need to jot down a note or do a quick calculation.

What Is A Notebook Computer?

In a sense, there are three, or possibly four, categories of portable computers. There is the group that first took the name portable—the Osborne, Kaypro, Compaq type of machine. We prefer to think of these sewing-machine size computers as "transportable" rather than truly portable. Most weigh well over 20 pounds and are not something you would want resting on your lap for an extended period of time. Their appeal for most users is something other than portability. These machines are not included in our roundup.

At the other end of the spectrum are the pocket computers such as the Sharp PC-1500, Casio FX-700P, and Radio Shack PC-1. These are capable little units for computational applications, but rather limited for general purpose computing. We have included two machines in this roundup that overlap the pocket category, the TI CC-40 and HP-75C, but we have excluded the true pocket units.

Between these two extremes lie the notebook computers. The forecasters at Future Computing see this group as being split between the Radio Shack Model 100 type of computer and machines with more extensive capabilities such as the Sharp PC-5000, Gavilan, and Grid Compass. We have chosen to ignore this split, although with the rapid migration to this part of the market, perhaps we, too, will be seeking new categories before long.

At the time we put this article on our editorial schedule, there were six notebook computers. In the next three months, ten additional machines were introduced, with two introduced the week before our deadline. Of this total of 16 machines, 14 are included in this roundup. The two that are not included are the Grid Compass and Universal Data UDI-500. We excluded the Compass because its $9000 price was more than twice that of the next machine down, and we felt that it had appeal for a rather different market. We excluded the UDI-500 because we were unable to get the data on it in time for our print deadline.

The Same and Different

The 14 notebook computers are similar in some ways, but quite different in many other ways. All are portable, although 1½ pounds is a great deal more portable than 11 pounds. All perform computations, although the fastest is a staggering 20 times faster than the slowest. The minimum amount of user programmable memory ranges from 8K to 128K, a 16 to 1 difference.

Most use a proprietary operating system, although in most cases it is not an operating system at all, but simply a traffic cop to direct information flow. All but one of the machines speak Basic, mostly Microsoft; many have communications capabilities; but fewer have word processing or spreadsheet packages available.

From these few comparisons, you can see that it is not just a matter of deciding you want a notebook computer, marching down to your local computer store, plunking down your money, and taking one home. As with any other computer purchase, you should have some idea of what you want to do with it, and then look for a machine to meet both your needs and your budget. Also, as with other computers, you almost certainly will find more uses for the machine than you originally anticipated; thus you should buy as much capability as you can comfortably afford.

As you get acquainted with notebook computers, you will find that the manufacturers have made all sorts of tradeoffs. Size versus extra features is an obvious tradeoff—you just can't fit a large display, modem, and printer in a package the size of a paperback novel. Price is a tradeoff against nearly everything—speed, memory capacity, and technical sophistication. In the following sections, we discuss some of the key features—and related tradeoffs—in more detail.

The Display

Every one of the 14 notebook computers uses a liquid crystal display (LCD), and three of them (Gavilan, Sunrise, and Toshiba) have the capability to drive a CRT monitor as well. Note that these are also three of the highest priced units.

The LCD display is the familiar black on gray found in most digital watches and calculators today. A key advantage to an LCD display is that it draws relatively little power and is more or less shock resistant. It is light in weight compared to a CRT, but, because of the rigid material required for the display, larger ones start to add pounds, not ounces, to the weight of a computer.

LCD displays have several disadvantages. First, the response time is much slower than a CRT. Second, the pixels are relatively large thus ruling out high-resolution graphics. Third, in certain lighting conditions, LCD displays are difficult to read, even though most of the computers provide both tilt and contrast adjustments. And fourth, LCD displays are very sensitive to cold; at temperatures below freezing, they don't work reliably, and may stop altogether.

The Gavilan, RoadRunner, and Sharp display the most text characters, although the physical size of the displays on these machines is not the largest. This means that the characters are quite small—about the same size as dot matrix printer output. The WorkSlate, a spreadsheet-only machine, displays even more characters in its higher 16-line x 46-character display; it is more readable.

The displays on the remaining machines use larger pixels; they thus have larger character sizes and are more legible. On the other hand, computers with

LCD Display

Computer	Lines x Chars.		Total	Graphics Pixels
WorkSlate	16	46	736	none
Sharp PC-5000	8	80	640	80x640
RoadRunner	8	80	640	64x480
Gavilan	8	80	640	64x400
Toshiba T100	8	40	320	64x240
NEC PC-8201	8	40	320	64x240
Radio Shack 100	8	40	320	64x240
Teleram 3000	4	80	320	none
Xerox 1810	3	80	240	32x480
Casio FP-200	8	20	160	64x160
Epson HX-20	4	20	80	32x120
Canon X-07	4	20	80	32x120
HP-75C	1	32	32	none
TI CC-40	1	31	31	none

Time and Accuracy

Computer	Time	Accuracy
Sharp PC-5000	0:18	.005859375
Gavilan*	0:20	.005859375
Toshiba T100	1:09	.187805
HP-75C	1:38	.00000002
NEC PC-8201	1:44	.187805
RoadRunner	1:48	.187805
Teleram 3000	1:48	.187805
Xerox 1810	1:48	.187805
Epson HX-20	2:36	.0338745
Radio Shack 100	4:54	.0000002058
Casio FP-200	5:05	.00723
TI CC-40	5:41	.00000011
Canon X-07	6:03	.0000002058
WorkSlate**	n/a	n/a

* Estimated values

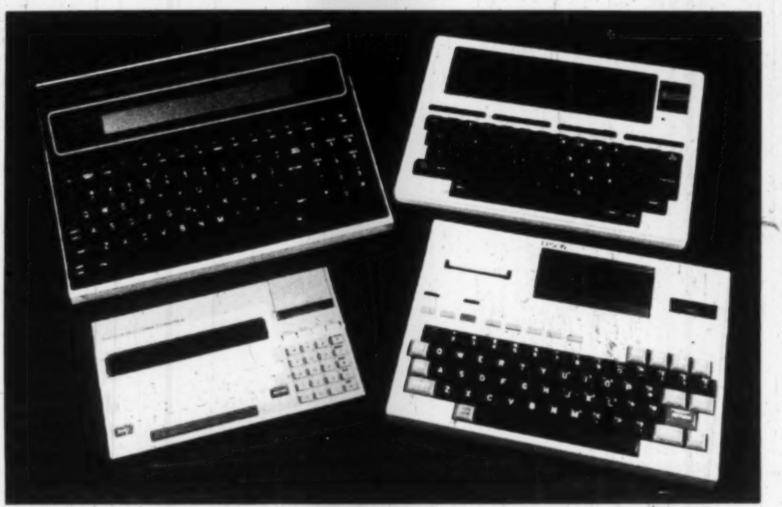
** Runs only spreadsheet software

one-line displays (HP and TI) are not usable for word processing, and are barely usable for spreadsheet work or even Basic programming. Even the two machines with 4-line by 20-character displays (Canon and Epson) are difficult to use and have been eclipsed by the larger LCD displays.

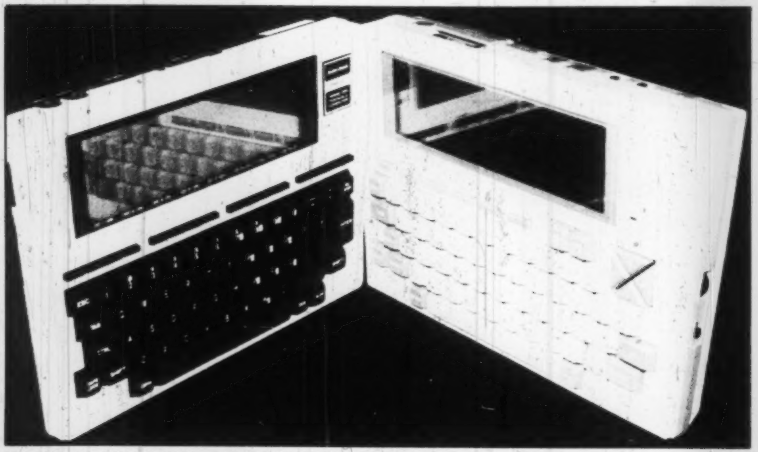
It is unlikely that you would want to use a notebook computer for any serious graphics except simple plots and bar charts. Ten of the computers provide such rudimentary plotting capability (see chart); we judge the Canon and Epson unsatisfactory for graphs even though Basic allows pixel addressing.

Speed and Accuracy

We were unable to run our benchmark on three of the 14 computers; however, based on the mpu, clock rate, and operating system, we were able to estimate the values for the Gavilan and Sunrise. As Basic is not offered on the WorkSlate, it is not included in the chart.



Four representative notebook computers: Teleram T3000, Radio Shack 100, TI CC-40, and Epson HX-20.



The Radio Shack 100 and NEC PC-8201 are twins in some regards, but they have their differences.

The two 16-bit 8088-based machines, the Sharp and Gavilan, are the speed demons. Both use MS-DOS with Microsoft GW (Gee Whiz) Basic. The Toshiba, NEC, and RoadRunner also use Microsoft Basic, but with an 8-bit 80C85 mpu, the CMOS version of the Z80A. Accuracy is grim, but speed isn't bad.

The Epson also uses Microsoft Basic, but on a different Z80 look-alike, a CMOS 6301 mpu. It is slightly slower, but considerably more accurate than the 80C85.

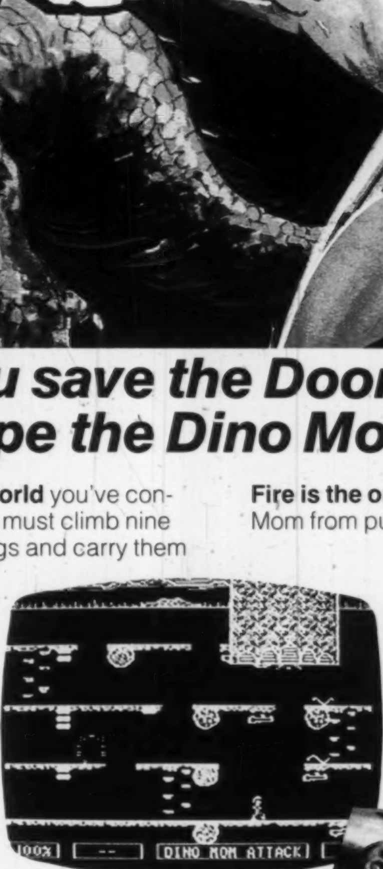
The Radio Shack Model 100 is a virtual twin of the NEC 8201 (both are made by Kyoto Ceramics in Japan), but Radio Shack elected to use double precision variables as the default mode. Hence, it is $2\frac{1}{2}$ times slower than the NEC, but has astoundingly greater accuracy. The Canon X-07 uses a similar approach but, because of running the mpu at a slower clock rate, is even slower.

Incidentally, double precision variables can be specified on the NEC,

Can you save the Doomed Dinos and escape the Dino Mom's stomp?

Warped into a prehistoric world you've contaminated the dinosaurs. You must climb nine deadly cliffs, find the dino eggs and carry them back to the 21st century.

Dodge the radioactive snakes and spiders when you climb, leap and jump over the challenging cliffs to locate the eggs. As you fight your way up the nine levels your skills must increase if you are to survive the deadly creatures



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CIRCLE 174 ON READER SERVICE CARD

T100
TOSHIBA

All of the notebook computers fit in an attache case. Here is one of the largest, the Toshiba T100, in a case with LCD display, acoustic modem, memory cartridge, and cables.

Toshiba, and RoadRunner and will yield the same speed and accuracy as the Model 100. The reverse is not true; specifying single precision on the Model 100 results in only about an 11% improvement in speed.

For a small machine, the HP-75 is amazingly fast and accurate; indeed it is the most accurate of all the computers we have ever tested, including several running in double precision mode.

The Casio and TI are the leisurely performers, but TI Basic with its 16-bit TMS 9995 mpu has the second best accuracy of all the computers tested, a nice plus for engineers and scientists who need accurate results to seven decimal digits.

Memory and Mass Storage

Four of the basic computers come with 8K of memory or less. Our experience indicates that this is barely adequate for any but the simplest applications. Two of the computers, the TI and the WorkSlate, can be expanded only to 16K; this, too, may prove limiting.

The upper internal memory limit on the next five machines is 32K, which should be adequate for most jobs. However, if you intend to leave several large programs or data files permanently or temporarily in the computer, you will probably want even more memory. The two 16-bit computers, the Sharp and Gavilan, provide the most internal memory capacity.

It is in the area of mass storage that manufacturers have taken radically different approaches. The HP-75C uses small magnetic cards, very convenient, but with rather limited capacity. Three of the computers have built-in microcassette recorders, the Epson, Xerox, and WorkSlate. This is a very satisfactory approach with a notebook computer as it does not require an external recorder with its added bulk and messy cables to be dragged around.

Another satisfactory, but more expensive approach, is plug-in RAM cartridges. The cartridges on the NEC, Toshiba, and RoadRunner are standard CMOS memory with a lithium battery. Even more expensive, but higher capacity bubble memory cartridges are available for the Sharp and Teleram.

The full-featured Gavilan has a touch pad, printer, and 3" floppy disk built in.

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- **PREVENTS ACCIDENTAL CHANGES**
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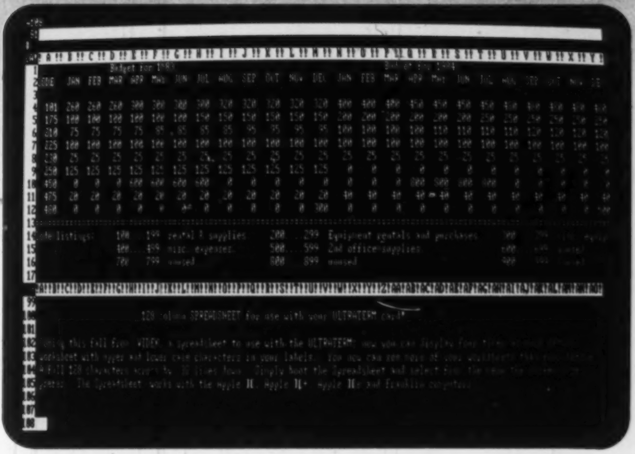
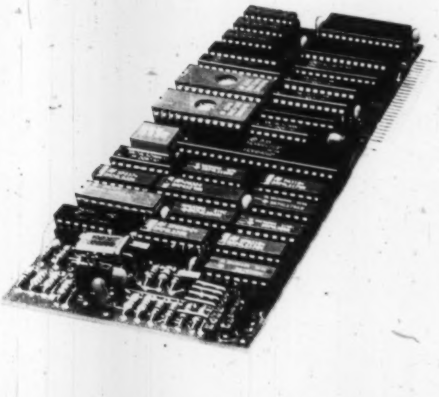
UltraPlan—an advanced spreadsheet program—makes planning, forecasting, and budgeting easy, fast, and accurate. UltraPlan can make full use of the UltraTerm, Videoterm, and can use additional memory cards for models as large as 512K. UltraPlan is compatible with VisiCalc® data files and features advanced commands not found in VisiCalc. UltraPlan is compatible with the Apple][and Apple //e computers.



Actual photo of 128x32 screen.



UltraTerm™

A DISPLAY PERIPHERAL

To display more than 80 columns or 24 lines, you will need an UltraTerm video display card. This card gives your Apple][or Apple //e the ability to display more characters than ever. Nine display modes that can display as many as 4096 characters allow you to choose the number of columns and rows best suited to your application.

UltraTerm utilizes 8 x 9 or 8 x 12 dot character matrix (versus the normal 5 x 7) to deliver superb resolution in the crispest, cleanest characters available anywhere.

Other display attributes such as highlight/lowlight, inverse, and half-intensity backgrounds can be chosen to suit your own viewing preferences.

Videoterm™

The Videoterm—the best selling 80 x 24 display card for the Apple][—can be used with UltraPlan. The advanced software features and expanded memory capability of UltraPlan are also available to Videoterm users.

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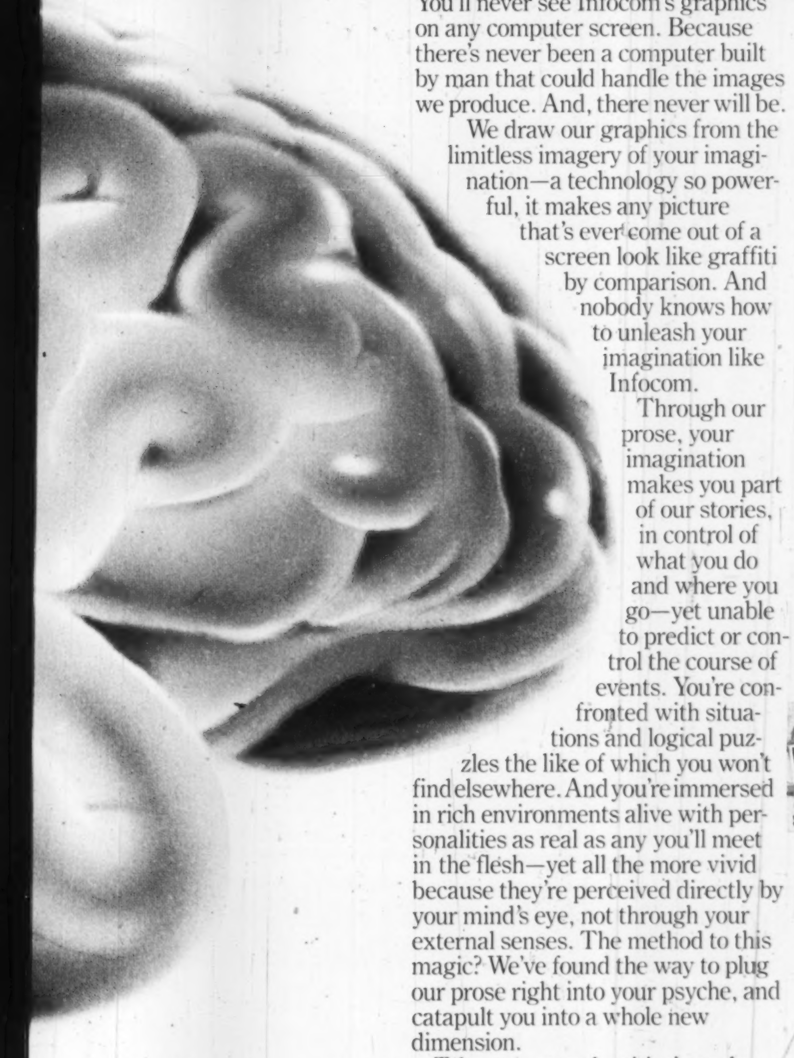

You'll never see Infocom's graphics on any computer screen. Because there's never been a computer built by man that could handle the images we produce. And, there never will be.

We draw our graphics from the limitless imagery of your imagination—a technology so powerful, it makes any picture that's ever come out of a screen look like graffiti by comparison. And nobody knows how to unleash your imagination like Infocom.

Through our prose, your imagination makes you part of our stories, in control of what you do and where you go—yet unable to predict or control the course of events. You're confronted with situations and logical puzzles the like of which you won't find elsewhere. And you're immersed in rich environments alive with personalities as real as any you'll meet in the flesh—yet all the more vivid because they're perceived directly by your mind's eye, not through your external senses. The method to this magic? We've found the way to plug our prose right into your psyche, and catapult you into a whole new dimension.

Take some tough critics' words about our words. SOFTALK, for example, called ZORK® III's prose "far more graphic than any depiction yet achieved by an adventure with graphics." And the NEW YORK TIMES saw fit to print that our DEADLINE™ is "an amazing feat of programming." Even a journal as video-oriented as ELECTRONIC GAMES found Infocom prose to be such an eye-opener, they named one of our games their Best Adventure of 1983.

Better still, bring an Infocom game home with you. Discover firsthand why thousands upon thousands of discriminating game players keep turning everything we write into instantaneous bestsellers.

Step up to Infocom. All words. No graffiti. The secret reaches of your mind are beckoning. A whole new dimension is in there waiting for you.

(For more information on Infocom games contact: Infocom, Inc., P.O. Box 855, Garden City, NY 11530.)

ZORK III
A LOCKED DOOR. A DEAD MAN.
DEADLINE
ENCHANTER
INFIDEL
PLANETFALL
WITNESS
SOMEBODY'S GOING TO TAKE THE DEEP SIX

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For your: Apple II, Atari, Commodore 64, CP/M 8," DEC Rainbow, DEC RT-11, IBM, MS-DOS 2.0, NEC APC, NEC PC-8000, Osborne, TI Professional, TI 99/4A, TRS-80 Model I, TRS-80 Model III.

CIRCLE 178 ON READER SERVICE CARD

Unique among the 14 machines is the Gavilan with a built-in 3″ floppy disk drive. Obviously, it must be treated with added care since a mechanical drive is inherently more sensitive to shock than a solid state device. Since none have been in the field long enough, we cannot comment on reliability.

Two of the computers, the Sharp and Toshiba, provide an interface to standard floppy disk drives for operation at home base. Several of the others plan to offer optional floppy disk interfaces.

Software, Internal and External

Eight of the 14 computers have proprietary operating systems which, as we said earlier, are generally not operating systems per se but rather controllers of information and data flow. The two 8088-based machines, the Sharp and Gavilan, have full MS-DOS operating systems with, seemingly, few compromises for the small size.

For of the 8-bit machines have CP/M or CP/M compatible operating systems. These four computers plus the two with MS-DOS are theoretically able to run more existing software packages than the machines with proprietary systems. But it doesn't always work out that way.

The chart shows the availability of Basic (Microsoft, on all but four machines). The calculator-like machines, TI and HP, each use their own Basic. The TI Basic on the CC-40 is similar to Microsoft, but HP Basic has many differences and idiosyncrasies. Casio Basic is similar to Microsoft, and the WorkSlate, of course, has no Basic at all.

The other software packages listed in the chart are those that are built into the basic hardware or are currently available on the appropriate media. On the machines with standard operating systems, other software packages can often be loaded through the RS-232 port and will run with minor modifications. For example, we loaded *WordStar* into our Teleram and got it running with relatively few problems. On the other hand, the menus and CRT screen overlays do not fit the LCD displays on these notebook portables, so even if a package can be loaded, it might not work.

Some of the manufacturers are encouraging the development of software by third party vendors, some are "not discouraging development," and still others plan to do everything internally or under contract and are not encouraging development at all.

Beyond the packages listed in the chart, currently, the most additional software is available for the TI, HP, and Toshiba computers. A goodly amount is available for the Radio Shack 100, and slightly less for the Epson and NEC 8201.

Computer	RAM Memory		Mass Storage
	Min	Max	
Sharp PC-5000	128K	256K	Bubble memory cartridges, external cassette or disk
Gavilan	64K	336K	3″ microfloppy
Teleram 3000	64K	64K	Bubble memory cartridges
Toshiba T100	64K	64K	RAM pack, ext. cassette, or floppy disk
RoadRunner	48K	48K	RAM cartridges
Xerox 1810	16K	64K	Microcassette
NEC PC-8201	16K	64K	RAM pack, ext. cassette
Epson HX-20	16K	32K	Microcassette
WorkSlate	16K	16K	Microcassette
Casio FP-200	8K	32K	RAM pack, ext. cassette
Radio Shack 100	8K	32K	External cassette
HP-75C	8K	32K	Magnetic card
Canon X-07	8K	24K	RAM card, ext. cassette
TI CC-40	6K	16K	External wafertape

Computer	Operating System	Basic	Spread Sheet	Word Processor	Comm.
Canon X-07	Prop.	MS	-	-	-
Casio FP-200	Prop.	Y	Y	-	-
Epson HX-20	Prop.	MS	-	Y	-
Gavilan	MS-DOS	MS	Y	Y	Y
HP-75C	Prop.	HP	Y	Y	-
NEC PC-8201	Prop.	MS	-	Y	Y
Radio Shack 100	Prop.	MS	-	Y	Y
RoadRunner	CP/M	MS	Y	Y	Y
Sharp PC-5000	MS-DOS	MS	Y	Y	Y
Xerox 1810	CP/M	MS	Y	Y	Y
Teleram 3000	CP/M	MS	-	Y	Y
TI CC-40	Prop.	TI	-	-	-
Toshiba T100	CP/M	MS	Y	Y	Y
WorkSlate	Prop.	-	Y	-	Y

Just How Portable is Portable?

Although notebook computers are considerably more portable than the machines that created the portable label just 1½ years ago, some are much more portable than others. In general, size is inversely proportional to capability and features, but this is not universally true.

Three of the machines weigh under two pounds and are about the size of a hardback novel. Two, the TI and HP, have one-line displays, but one, the Canon X-07, packs a four-line display in this size package.

The WorkSlate is slightly larger but, because of its flat, less-than-full-stroke keyboard, it is just an inch thick. Its 16-line x 46-character display is a nice treat on a machine this small.

Going up in size, the next six machines (Epson, Radio Shack, NEC, Casio, Xerox, and RoadRunner) all weigh between four and five pounds, and all are the size of a thick (2″ to 3″)

Computer	Weight	Size			Volume
Canon X-07	1.1 lb.	8.0″ x	5.1″ x	1.0″	41 cu. in.
TI CC-40	1.4	9.5	5.8	1.0	55
HP-75C	1.6	10.0	5.0	1.3	65
WorkSlate	3.2	11.3	8.5	1.0	96
Epson HX-20	3.8	11.3	8.5	1.8	173
Radio Shack 100	3.8	11.8	8.5	2.0	201
NEC PC-8201	3.8	11.8	8.5	2.4	241
Casio FP-200	4.0	12.5	8.8	2.2	242
Xerox 1810	5.0	16.0	9.0	2.0	288
RoadRunner	5.0	11.5	7.8	3.0	269
Gavilan	9.0	11.4	11.4	2.8	364
Teleram 3000	8.8	13.0	9.7	3.5	441
Sharp PC-5000	11.0	12.8	12.0	3.4	522
Toshiba T100	13.0	16.5	11.0	4.0	726

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Now you're risking yours to destroy it.

The odds are not in your favor. Because, you see, the other side is waiting for you.

Time is short, so you'll have to fly. But fly too fast, and you'll squander your precious fuel supply.

(By the way, since you're not expected back, they didn't bother to give you a parachute.)

As you soar over hundreds of miles of distinctly unfriendly territory, the action is thick, fast and frighteningly three-dimensional. Fighter aircraft. Helicopter gunships. Surface-to-air missiles. The attacks come from every direction.

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Notebook computers are an excellent sales tool. Here is a RoadRunner in the field.

Notebook computers are excellent travelling companions. Unfortunately, four airlines have banned their use in recent weeks.

three-ring binder. All will fit easily in a standard attaché case, and weigh no more than an equivalent amount of paper.

The next four machines represent a big jump in size and weight. While none of them approach the size and weight of the sewing machine portables, you will probably think twice before tossing one of them in your briefcase. Ten pounds sounds light, but on long trips your arm will start to feel as though it is stretching.

In some sense, the Toshiba is not a true portable, since it requires an AC power source. The design philosophy was to produce a machine, the cpu of which could be carried around along with a small LCD display, modem, and memory cartridges for work away from the home office. Back home, the same T100 serves as a desktop computer with a stationary monitor and floppy disk drives.

Overall Ratings

The overall ratings of any products are, of course, affected by the biases of the testers. This is no exception. We are computer enthusiasts, so we look for good performance. We are writers, so we look for excellent word processing. We travel a great deal, so we look for lightweight portability. We are underpaid, so we look for an attractive price. We are impatient, so we look for fast storage.

In an effort to remove our biases, we rated each computer in each of 12 areas, as objectively as possible. We added up the total points and plotted the resultant value against the price.

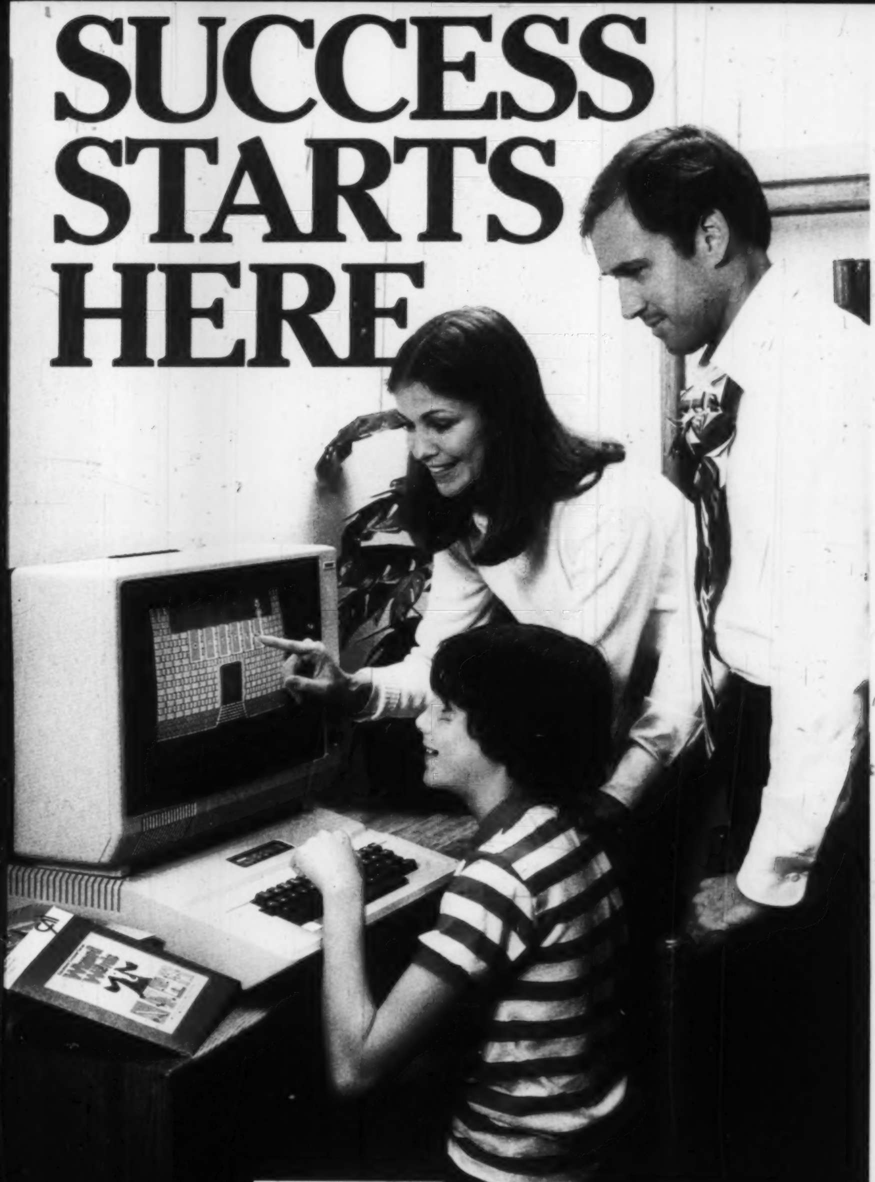
The following are the 12 areas of ranking, and how each was scored.

- *Speed:* 7 minus benchmark completion time to nearest minute.
- *Size/Weight:* 8 minus weight divided by 2, rounded off.
- *Keyboard:* 5, standard full-stroke; 4, non-standard; 3, full-size, not full-stroke; 2, smaller; 1, calculator style.
- *Display:* Characters in display divided by 120, rounded off.
- *I/O:* Number of I/O ports.
- *Memory:* Minimum internal memory divided by 16K.
- *Mass Storage:* 5, floppy or bubble memory; 4, RAM cartridge; 3, built-in cassette; 2, external cassette; 1, other.
- *Programming Ease:* 5, large display, on-screen editing; 4, medium display, on-screen editing; 3, small display, on-screen editing or no on-screen editing; 2, one-line display; 1, no programming.
- *Graphics:* display height in inches plus number of vertical pixels divided by 20, rounded off.
- *Software:* Packages currently available; maximum 6.

Computer	Speed	Weight	Keyboard	Display	Input/Output	Memory	Mass Storage	Programming	Graphics	Software	Battery life	Features	Total
TI CC-40	1	7	1	0	1	0	2	2	0	5	8	0	27
Casio FP-200	2	6	3	2	2	1	2	4	4	2	3	0	31
WorkSlate	3	6	3	6	2	1	3	1	0	2	3	1	31
Canon X-07	1	7	2	1	3	1	2	3	3	1	8	1	33
HP-75C	5	7	1	0	2	1	2	2	0	5	8	0	33
Teleram 3000	5	4	5	3	2	4	5	4	0	3	2	1	38
Toshiba T100	6	0	5	3	4	4	4	4	5	6	0	1	40
Radio Shack 100	2	6	5	3	5	1	2	3	5	5	2	1	40
Epson HX-20	4	6	5	1	3	1	3	3	3	2	8	2	41
NEC PC-8201	5	6	5	3	5	1	4	4	5	3	2	0	43
RoadRunner	5	5	5	5	3	3	4	3	4	4	2	1	44
Xerox 1810	5	6	5	2	4	2	3	4	5	4	2	3	45
Sharp PC-5000	7	3	5	5	4	8	5	5	5	4	2	1	54
Gavilan	7	4	5	5	4	5	5	5	5	4	2	5	56

A ____________________
B ____________________

SUCCESS STARTS HERE



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• *Battery Life:* Life in hours divided by 5, maximum 8.

• *Other Features:* Count of number of additional features (such as built-in floppy disk, built-in printer, etc.)

Our Chart, And Yours

At the bottom of the ratings chart, we left room for two additional computers. Here you can rate the new ones that inevitably were introduced the day this magazine went to press. Or you can rework some of our figures.

After computing the ratings, we plotted the overall total against the suggested list price. Five of the machines are practically sitting on the price/performance curve. They are the Casio, WorkSlate, HP-75C, RoadRunner, and Xerox. All are priced fairly for their capability and features.

The computer that was introduced the earliest in this group of 14 is the Teleram 3000. At the time of its introduction, it represented a breakthrough on many fronts, and was priced accordingly. Today, however, a different competitive climate exists, and the Teleram, at $2495, appears to be overpriced for what it delivers.

The Toshiba T100 is also over the curve, but for a different reason. As we

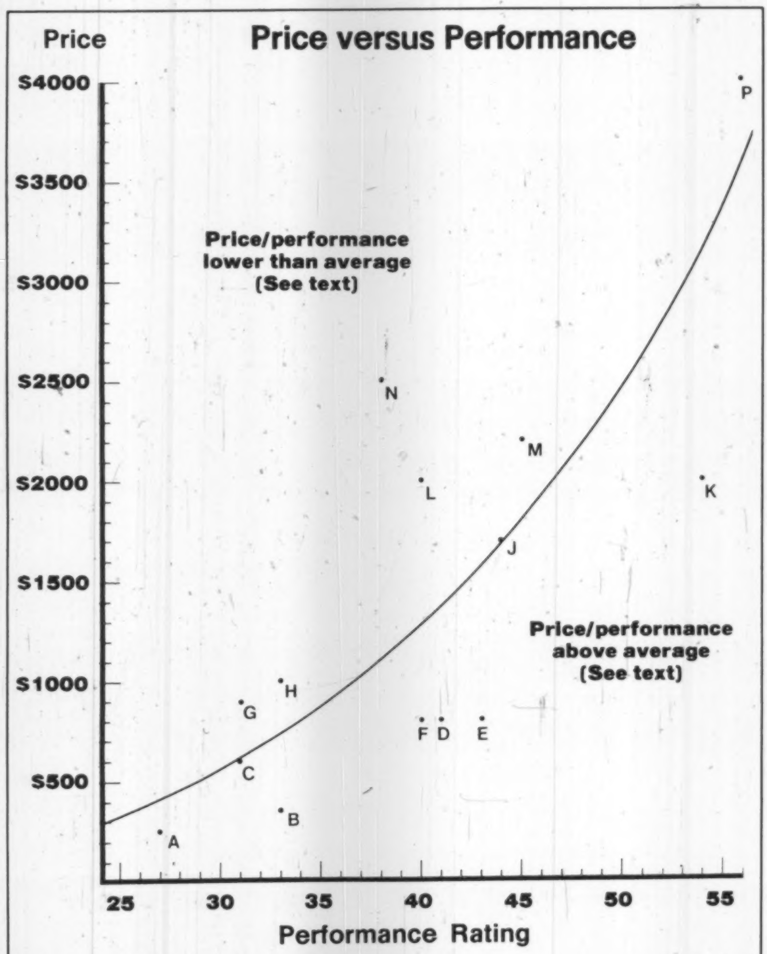
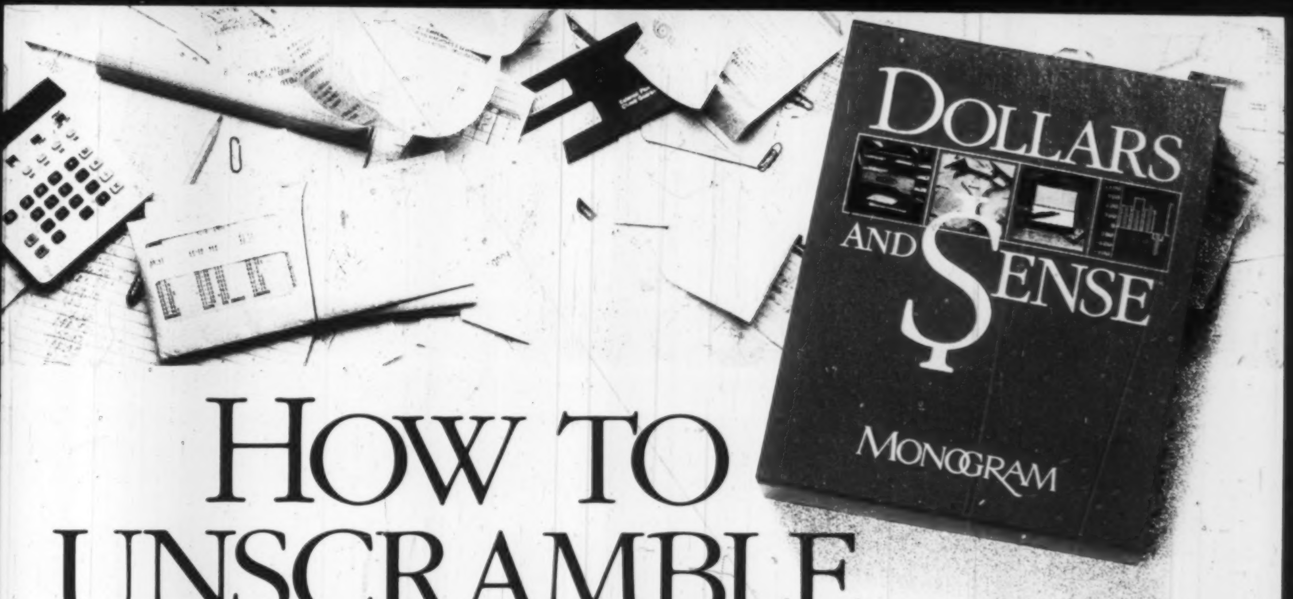


Table 1. Chart plots price (vertical) against performance (horizontal). Curve shows average for 14 notebook computers.

A	*TI CC-40*	F	*Radio Shack 100*	L	*Toshiba T100*
B	*Canon X-07*	G	*WorkSlate*	M	*Xerox 1810*
C	*Casio FP-200*	H	*HP-75C*	N	*Teleram T3000*
D	*Epson HX-20*	J	*RoadRunner*	P	*Gavilan*
E	*NEC PC-8201*	K	*Sharp PC-5000*		



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mentioned earlier, the T100 is the cpu component of a full-fledged desktop machine, one which we rated very highly in our review in November. Hence, it should not be compared only to portables, but should be viewed in its dual role. In this light, it may well represent a bargain.

Also above the curve is the Gavilan. This is a state-of-the-art machine that offers many novel and unique features—built-in 3" floppy disk, touch pad, snap-on printer, and Lisa-like software. Obviously, this all costs money, and the Gavilan is priced accordingly.

But perhaps most interesting are the five machines that fall below the curve, and thus represent a relative bargain. At the low end is the TI CC-40. For professionals, students, and engineers, this is an unbeatable machine at only $250, frequently discounted to well under $200.

Although we haven't had an opportunity to give the Canon X-07 a thorough shakedown, at $350 it appears to be a good buy.

Computer	Price
TI CC-40	$ 250
Canon X-07	350
Casio FP-200	499
Epson HX-20	795
NEC PC-8201	795
Radio Shack 100	799
WorkSlate	895
HP-75C	995
RoadRunner	1695
Sharp PC-5000	1995
Toshiba T100	1995
Xerox 1810	2195
Teleram 3000	2495
Gavilan	3995

Coming up a bit, if you can put up with the small screen size of the Epson HX-20, it offers a large amount of capability and extra features such as a built-in microcassette and printer and long battery life.

The Radio Shack 100 and NEC 8201 twins also fall below the curve. In our ratings, the NEC is the preferred machine, mainly because of the plug-in memory cartridges and on-screen Basic editing. On the other hand, if you want a built-in modem, the Model 100 is the machine of choice.

At the high end, the Sharp PC-5000 falls way below the curve. This is a spectacular, state-of-the-art computer offering tremendous capability in the $2000-3000 price range. The only real disadvantage of the Sharp is the 11-pound weight and somewhat greater bulk than many other units. To us, this seems a small drawback against its outstanding performance.

Obviously, our choice is not necessarily yours. Choosing a notebook computer—or any computer for that matter—is not easy. The increasing number of entries in the market and the bewildering array of features make the choice a tough one. Armed with the information from this issue, plus a healthy dose of skepticism and patience, you should be able to find the computer that best meets your needs and budget.

Computer, Issue Reviewed Manufacturer Name & Address

Canon X-07
Canon USA
One Canon Plaza
Lake Success, NY 11042
(516) 488-6700

CIRCLE 401 ON READER SERVICE CARD

Casio FP-200
Casio, Inc.
15 Gardner Rd.
Fairfield, NJ 07006
(201) 575-7400

CIRCLE 402 ON READER SERVICE CARD

Epson HX-20
(March 1983, Buyer's Guide 1984)
Epson America, Inc.
3415 Kashiwa St.
Torrance, CA 90505
(213) 539-9140

CIRCLE 403 ON READER SERVICE CARD

Gavilan
Gavilan Computer Corp.
240 Hacienda Ave.
Campbell, CA 95008
(408) 379-8000

CIRCLE 404 ON READER SERVICE CARD

HP-75C
(Buyer's Guide 1984)
Hewlett Packard
1000 N.E. Circle Dr.
Corvallis, OR 97330
(503) 757-2000

CIRCLE 405 ON READER SERVICE CARD

NEC PC-8201
(August 1983, Buyer's Guide 1984)
NEC Home Electronics
1401 W. Estes Ave.
Elk Grove Village, IL 60007
(312) 228-5900

CIRCLE 406 ON READER SERVICE CARD

Radio Shack 100
(August 1983, Buyer's Guide 1984)
Tandy Corp.
Fort Worth, TX 76102
(817) 390-3011

CIRCLE 407 ON READER SERVICE CARD

RoadRunner
(January 1984)
MicroOffice Systems Technology
35 Kings Highway East
Fairfield, CT 06430
(203) 367-2525

CIRCLE 408 ON READER SERVICE CARD

Sharp PC-5000
(January 1984)
Sharp Electronics Corp.
10 Sharp Plaza
Paramus, NJ 07652
(201) 265-5600

CIRCLE 409 ON READER SERVICE CARD

Teleram 3000
(January 1984)
Teleram Communications Corp.
2 Corporate Park Dr.
White Plains, NY 10604
(914) 694-9270

CIRCLE 410 ON READER SERVICE CARD

TI CC-40
(August 1983, Buyer's Guide 1984)
Texas Instruments
P.O. Box 225012
Dallas, TX 75265
(214) 995-3741

CIRCLE 411 ON READER SERVICE CARD

Toshiba T100
(November 1983)
Toshiba America, Inc.
2441 Michelle Dr.
Tustin, CA 92680
(714) 730-5000

CIRCLE 412 ON READER SERVICE CARD

WorkSlate
Convergent Technologies, Inc.
2441 Mission College Blvd.
Santa Clara, CA 95050
(408) 727-8830

CIRCLE 413 ON READER SERVICE CARD

Xerox 1810
Xerox Corp.
Xerox Square 006
Rochester, NY 14644
(716) 423-3539

CIRCLE 414 ON READER SERVICE CARD

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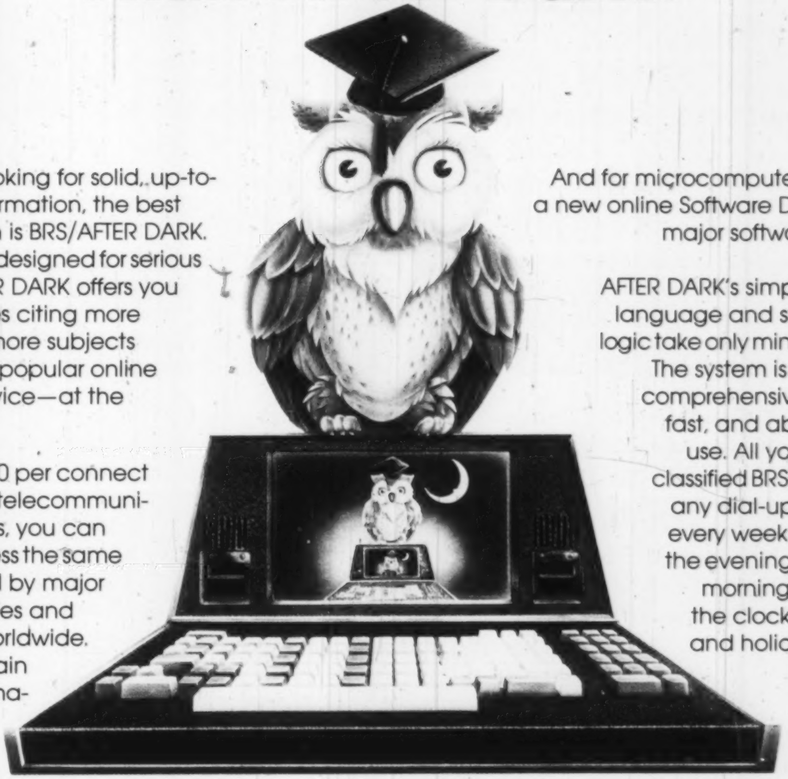

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The Ultimate Notebook Computer

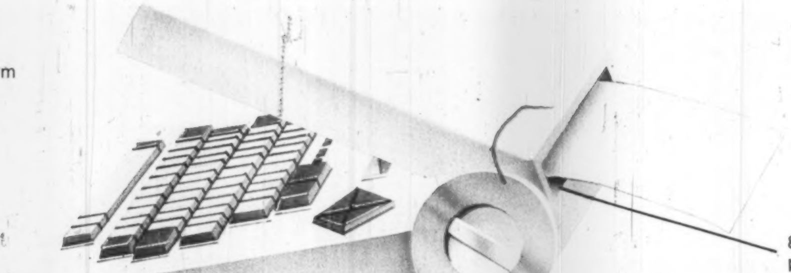
David H. Ahl

While doing the series of articles on notebook computers, speaking to manufacturers, and, most of all, using a notebook computer for the past nine months, I thought of many things that I would like to see on the ultimate notebook computer.

That is not to say that today's machines aren't good—they are. In fact, I firmly believe that notebook computers will have more impact on the way people use computers than anything else since the first computer was invented. They will have more impact than transistors, than minicomputers, than microcomputers, or than graphics displays. Why? Because now you can take a computer anywhere. Your mind extending tool can be your constant companion—and it will be.

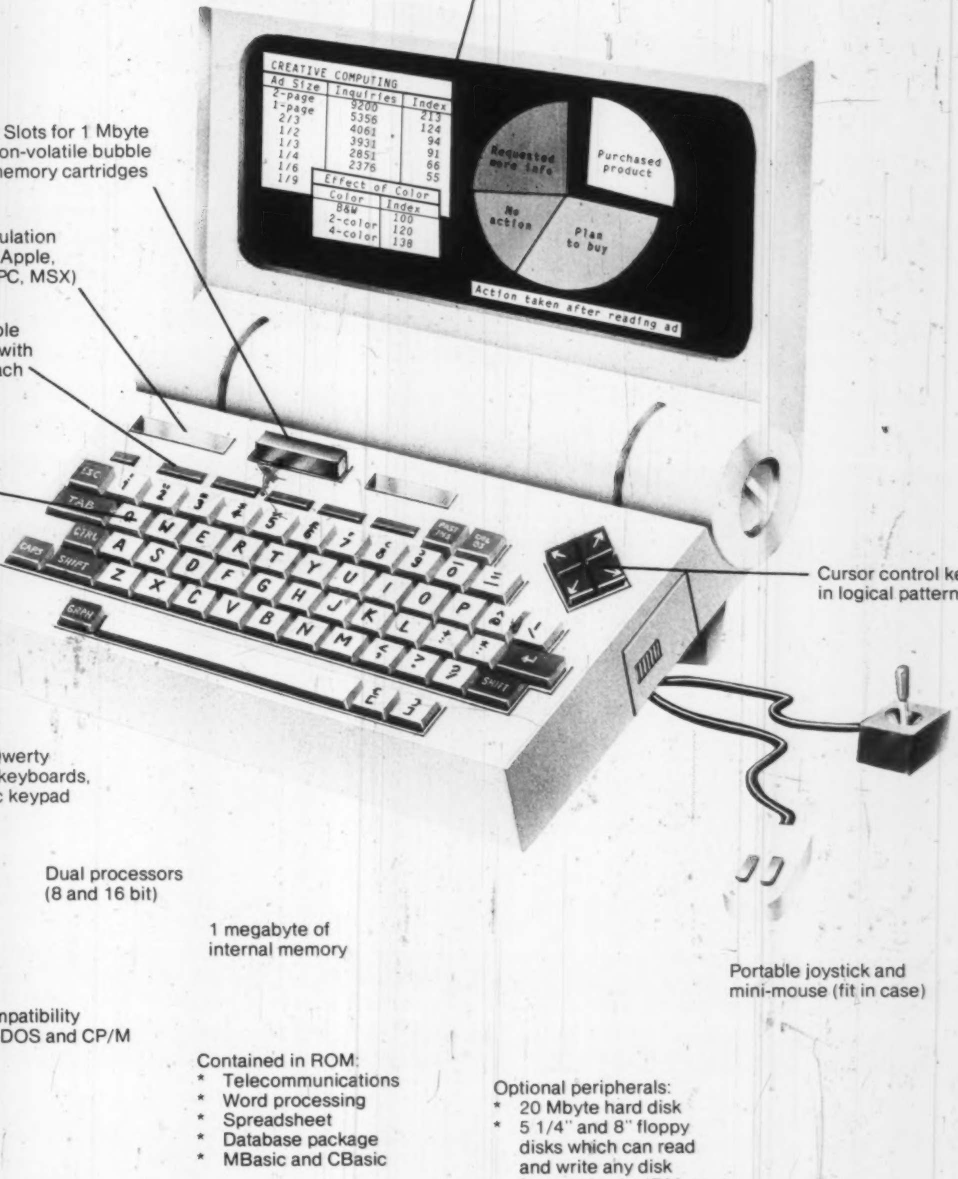
But what would be nice to have on it compared to the machines of today? Frankly, just a few additional touches would make today's notebook computers nearly ideal. A little less weight, a touch-sensitive color screen, the ability to run a wide range of software, stereo sound, and a longer battery life would make a mighty fine machine.

We put our heads together, came up with a wish list, and then had John Jinks do a rendering of the Ultimate Notebook Computer.


Built-in 1200 baud auto-dial, direct-connect, auto-answer smart modem
Hands-free conference telephone built in
Clock/calendar that can wake up computer to perform any operation
80-column color plain paper printer/plotter
Output connectors:
* RS-232 serial
* Centronics parallel
* Bar code reader
* Telephone jack
* Joystick/mouse
* Stereo amplifier
* RGB, NTSC, and RF
* Videodisc control
Dimensions closed: 11" x 6" x 2.5"
Weight: 1.2 pounds
Battery powered; two years between charges

Stereo sound; 3 voices
per channel, 5 octaves

Touch-sensitive,
flat screen color
display (5.5" x 9").
Up to 32 lines of 132
characters; graphics
resolution 768 x 1024.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2/3	4061	94
1/2	3931	91
1/3	2851	66
1/4	2376	55
1/6		
1/9		

Effect of Color

Color	Index
B&W	100
2-color	120
4-color	138

2 Slots for 1 Mbyte
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Slot for emulation
cartridges (Apple,
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5 Programmable
function keys with
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63 Full-stroke
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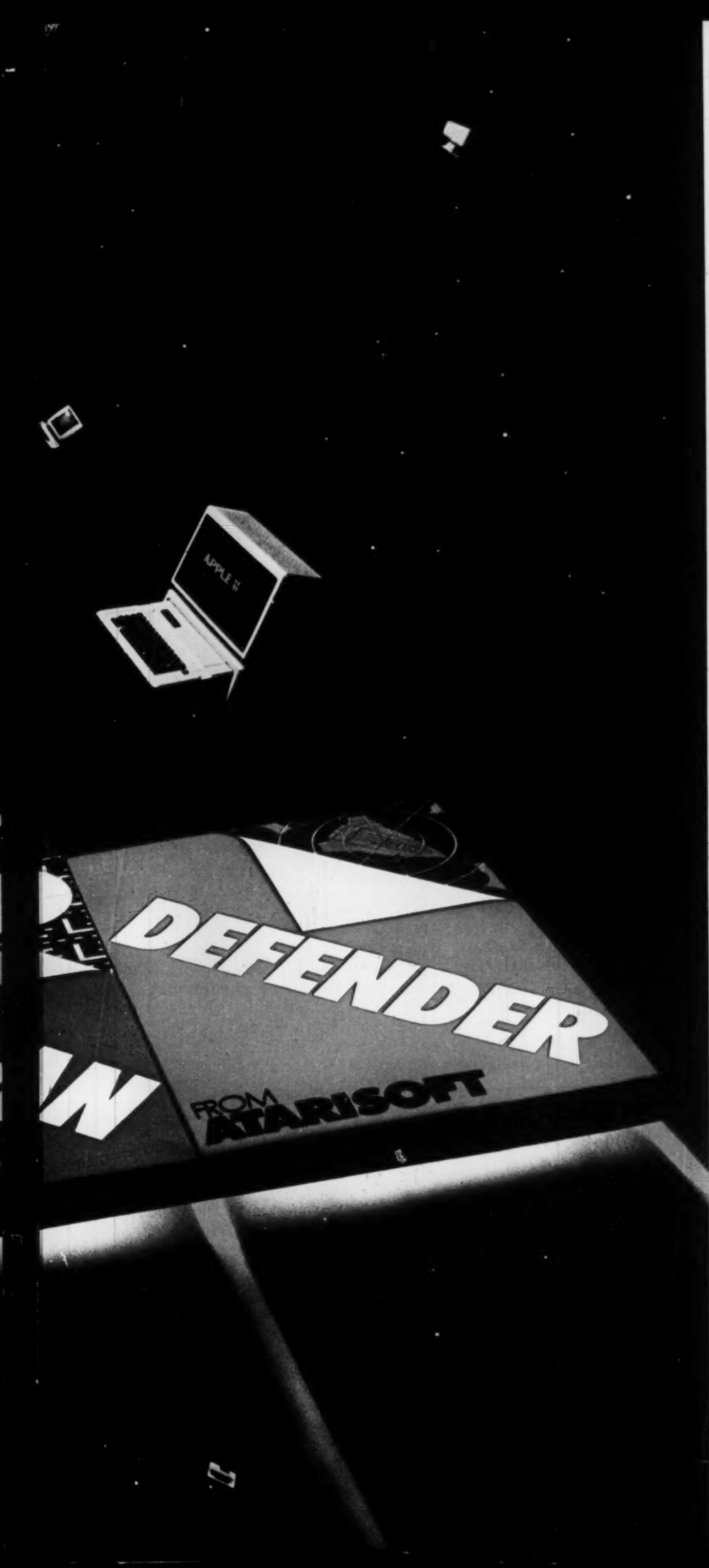
ATARISOFT



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ASM 7

CIRCLE 104 ON READER SERVICE CARD

14 Notebook Computers in Brief

David H. Ahl

Since the introduction of the first pocket computers just over two years ago and the first transportables about 1½ years ago, we have been avidly following the developments in the field. We have reviewed a cross section of these computers on the pages of *Creative Computing* (the dates of these reviews are noted in the chart at the end of the previous section).

This section is not intended to be an exhaustive, in-depth review of the computers. Rather, it contains a description of each machine including impressions from our review of it or from the comments of other users.

Texas Instruments CC-40

The Texas Instruments Compact Computer 40 (CC-40) bridges the gap between the pocket and notebook categories. It has one of the best versions of Basic ever offered by TI and provides exceptional accuracy, albeit rather slowly.

The CC-40 is powered by four AA alkaline batteries which will last for 200 hours of use, considerably longer than most other notebook machines. If you prefer, an AC adapter is also available.

Although the keyboard is arranged in the standard QWERTY layout, it is only two-thirds the size of a standard keyboard and sports calculator-style keys. Thus, touch typing is not possible, and even experienced typists will find a two-finger approach more reliable. For data entry, a numeric keypad is provided to the right of the main keyboard.

The CC-40 uses a single line, 31-character display capable of reproducing upper- and lowercase text and a variety of graphics symbols. The display scrolls horizontally on a maximum 80-character line. The LCD screen also displays several special status indicators above and below the main text line, so it is more versatile than it might appear.

As it comes out of the box, the CC-40 does not interface to anything directly—not even a cassette recorder. However, an eight-pin connector attaches to a hexbus peripheral module. This unit provides an interface to three peripherals, an RS-232 interface, a printer/plotter, and a wafertape drive. On the top of the CC-40 is a cartridge port that can accept ROM cartridge software or a memory expansion cartridge.

TI has announced a wide variety of software packages on both wafertape and ROM cartridges. The packages tend to be adaptations of programmable calculator software and will have greatest appeal for engineers and financial analysts.

The most likely market for the TI CC-40 is probably as a competitor to pocket computers and as an upgrade from programmable calculators. In this market with its low price tag (frequently discounted to under $200), it is a formidable competitor.

Casio FP-200

Casio is a very successful maker of calculators, watches, and electronic musical keyboards. However, their previous forays into computers have ended in failure, at least in the U.S. With the FP-200, they have taken a different approach and may be able to carve out their own niche in the market.

The FP-200 is primarily a spreadsheet machine and runs a built-in software package called CETL (Casio Easy Table Language). It is a *VisiCalc*-like language, and anyone familiar with another spreadsheet will be able to use it immedi-

Texas Instruments CC-40

Casio FP-200

HELENA ON CREATIVITY.

Name:	Helena Paoli
Age:	9
Home:	Belvedere, California
School:	Bel Aire
Hobbies:	Drawing, playing with dolls, reading, swimming
Ambition:	To be a fashion designer
Favorite software:	Creature Creator™ by DesignWare

"I like *Creature Creator* because it's kinda like drawing — only the pictures are alive! I can make different creatures, and then make them do lots of different dances.

"Lots of games — well, you just keep shooting or dodging things until you learn the pattern. Then you can beat it easily, and you get bored.

"*Creature Creator* lets me use my imagination. Now a couple of kids have it, so we get together to compare the creatures and monster dances we've made."

DESIGNWARE ON CREATIVITY. Children learn the most through creative problem solving. That's why *Creature Creator,* like so many DesignWare games, is an open-ended exercise that challenges and nourishes young minds. In a way that's a lot of fun.

DesignWare programs go far beyond putting a sugar coating on rote drills; they encourage kids to draw on something they just happen to have an unlimited supply of — imagination!

SPELLING, MATH, OR LANGUAGE. Games like *Creature Creator, Spellicopter*™ and *Math Maze*™ inspire youngsters to tap into that fertile idea-field. To actively become part of the program, in effect creating "new" games as they go along. And all the while building up solid skills in the basics. And all the while having a lot of plain old fun.

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As Helena Paoli says, "Mom, Dad — look what I've created now!"

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DO THE MONSTER MATCH

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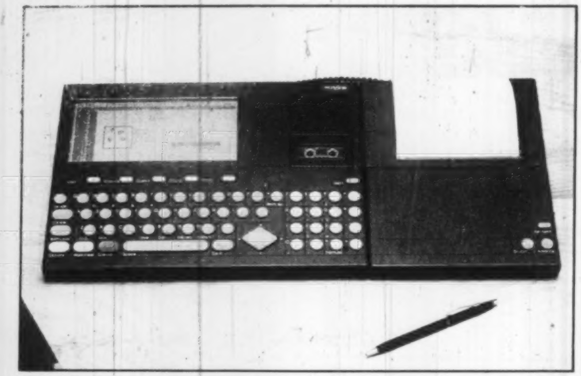
CIRCLE 152 ON READER SERVICE CARD



WorkSlate

Canon X-07

ately. Also built-in is Casio Basic, a Microsoft-like implementation with rather leisurely performance.

The FP-200 is built around a CMOS version of the Z80 and has 32K of ROM and 8K of RAM, expandable to 32K. External mass storage requires either a cassette tape recorder (300 baud) or a 70K single-sided, single-density floppy disk drive. Output ports are also provided for a parallel printer and RS-232 serial device such as a modem.

The FP-200 has an 8-line x 20 character display. For graphics, 64 x 160 pixels can be individually addressed.

The keyboard is full-size, but uses calculator-style short-throw keys. It has 57 alphanumeric keys, four special keys, five function keys (two meanings each), and four cursor keys (arranged in a straight line). An optional, external numeric keypad is available.

The FP-200 would be a good choice if you are looking for a machine primarily for spreadsheet calculations and some Basic programming. The keyboard renders it unsuitable for word processing, even if there were software available which there is not. Several utility software packages (sort/merge, statistics, graphics) are promised and would further enhance the utility of the machine.

The suggested retail price is $499, but we have yet to see a machine in any retail outlets.

WorkSlate

Like the Casio FP-200, the WorkSlate from Convergent Technologies, is primarily a spreadsheet machine. Indeed, all the software packages on the WorkSlate are various adaptations of the basic spreadsheet program.

In a departure from all of the other notebook computers, the WorkSlate uses a CMOS version of the 6800 mpu. Included with the basic system is 16K of RAM memory. Currently, this is not expandable, but a company spokesman tells us that a 16K upgrade (32K total) will eventually be available. That is necessary, because the 16K gets filled up with just a 30 x 24 cell spreadsheet; in this state, it takes over two minutes just to perform a simple operation. Theoretically, a spreadsheet can expand to 128 rows and columns, but if you have 128 in either dimension, 5 is the maximum in the other.

The display on the WorkSlate consists of 16 lines by 42 characters. Some lines are devoted to status indicators, headings, and formulae; as a result, about 11 by 5 cells of a spreadsheet are visible at a time.

The keyboard follows the QWERTY layout, but it is about six percent smaller than a standard keyboard. This is not bothersome, but the circular keys with less than full travel might be. Clearly, it is not designed for text entry, and the majority of the numeric entries will be made from the numeric keypad to the right of the main keyboard. Indeed, there is no row of numeric keys over the alphabetic portion of the keyboard. A nice touch is the large diamond shaped cursor control key between the alpha and numeric keys.

To the right of the display is a microcassette recorder. This is a dual-function unit which can record either data or audio. The data transfer rate is 2400 baud, one of the fastest available on a small computer. For audio recording, WorkSlate has a built-in speaker, microphone, and jacks for an external earphone and microphone.

Also built in are a direct-connect, 300-baud modem and communications software. A matching printer, capable of 40- or 80-column compressed print widths is available for $250. Alternatively, an adapter is available for standard parallel or RS-232 serial printers or other devices.

We mentioned software packages other than the basic spreadsheet. These are Memo Pad, Phone List, and Calendar. Actually, the only difference between these and blank spreadsheets are some headings, graphics, and modifications of column width. In other words, a Memo Pad is simply a spreadsheet whose A column is 128 characters wide. Two self-instruction tutorial tapes are also available.

As the reviewer in our sister publication, *Computers & Electronics* concluded, "The features of WorkSlate are geared to the business person who wants spreadsheet capabilities in a portable package without all the fuss of learning about computers. For those who want such a business tool, WorkSlate has hit its design mark."

Canon X-07

The Canon X-07 is an exceptionally compact computer, weighing just over one pound. It has a four-line display, sensible cursor movement keys, and a novel optical communications capability.

The X-07 is primarily intended for computing in Basic, and no other software is currently built-in or offered. The default mode for calculations is double precision; as a result, the machine is quite accurate, but was the slowest of the 14 tested.

The X-07 uses a CMOS version of the Z80 mpu and has 20K of ROM and 8K of RAM (expandable to 24K). An external cassette recorder provides mass storage. The X-07 is powered by four AA akaline batteries with a rated life of "up to 2000 hours of use." Unbelievable!

Small memory cards about the size of two stacked credit cards are available with both ROM for applications software packages and RAM for removable user memory. Each card has a lithium watch battery which provides power for over a year.

The keyboard is laid out in QWERTY fashion, but it is 20% smaller than a standard keyboard and has calculator-

Sports Illustrated

Sports Special

microcomputer news

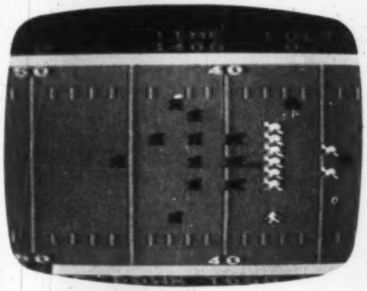
Tuesday, April 1

Four exciting sports games from Avalon Hill

Colts romp over Dolphins, 24-7

Last night's sensational gridiron duel proved there are no underdogs in Avalon Hill's **Computer Football Strategy**.

The Colts ran in the first Miami punt and then capitalized on a Dolphin fumble to jump out to a quick 14-0 lead.



Early in the 1st qtr. with Colts in possession
ATARI SCREEN

Dropped passes, penalties, fumbles . . . all took their toll in the exciting contest in the home of Ogie Pincikowski, newest armchair quarterback. Says Ogie with some satisfaction, "It's the next best thing to being out on the gridiron itself!"

In Avalon Hill's **Computer Football Strategy** you pit your skills as play caller against the computer or go head-to-head with a live opponent.

Atari® Home Computers 32K Disk (joystick required); Commodore 64® Disk; IBM® PC 64K Disk; TRS-80® 32K Disk and 32K Cassette for Models I/III/IV; Commodore 64® Cassette & Atari® Home Computers Cassette. All Diskettes $21; Cassettes $16.

Marciano to spar Ali

Tomorrow night's 15 round **Computer Title Bout** matchup between two of professional boxing's greatest fighters promises to be historic in all senses of the word.

This "Match from the Past", as the bout has been dubbed, is slated to begin at 9pm in the basement of Marvin "Max" Maxwell's house on the outskirts of Baltimore. States Max, "I've always wondered if the incredible boxing skills of Ali could stand up to the sledgehammer fists of the Brockton Blockbuster."

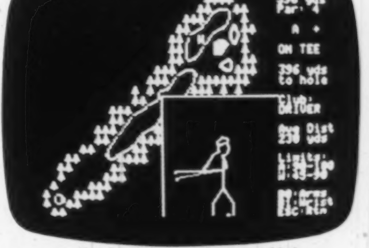
Avalon Hill's **Computer Titlebout** will factor in dozens of variables in deciding the ultimate winner, round by grueling round.

Adds Max, "The game gives you the statistics of hundreds of contenders, and lets you do the pairing up. In fact, you can even create your own fighter. **Computer Title Bout** is a fast-moving game for two players, or solitaire against yourself."

Atari Home Computers 48K Disk for $30.

Tournament Golf a hole-in-one

"Sixteen feet to the hole and a steep break to the left." Harvey Hornbuster carefully considered his predicament. The entire match had come down to this last putt. Sink it and he's a hero; miss it and he'll be buying the drinks.



Hornbuster teeing off on second hole

Carefully, with a steady hand and just the right twist to the wrists, Harvey took his putt. Looking over his shoulders at the video screen, the other members of his foursome held their breath and stared as the ball steadily approached the hole and then disappeared. A perfect putt!!

Tournament Golf brings you all the tense excitement of a real day out on the links right in your own home. Hooks, slices, muffs, traps, water hazards and rough . . . it's all there and more, including two challenging 18 hole championship golf courses.

Apple Home computers 48K Disk for $30. Joystick/Paddles required.

Upstart Cubs Take AH Series in 6

Chicago's stunning victory yesterday in the living room of **Computer Statis Pro Baseball's** AH-League manager Milton Mousehouse didn't surprise the team's owner, Fred Smith. Commented Smith after the victory, "It was just sound management. My lineup selection, pitcher choices and timely substitutions carried me through."

Trailing 4 to 1 going into the ninth inning, the Cubs' bats finally came alive as they pounded in 5 runs to win the game, and the championship, 6 to 4. A good showing for Fred's cubs, especially after dropping the first two games to the defending champions, the Baltimore Orioles.

Added Milton, "Avalon Hill's **Computer Statis Pro Baseball** places you in charge of your favorite ballclub. **Your** decisions can make an also-ran into a pennant winner. You don't play against the computer. You can, however, play against yourself and have the computer do all the bookkeeping. It will even supply you with a printout of the boxscores after each game, if you have a printer."

Of course, you can also do as Milton and his friends did and organize a league of your own, capping it off with your own championship series. **Computer Statis Pro Baseball** puts you in the dugout, so to speak, especially with Milton's wife Mortina supplying the hot dogs!

Apple Home Computers 48K Disk for $35; TRS-80 Mods. I/III/IV: 16K Cassette $25 & 32K Disk $35.

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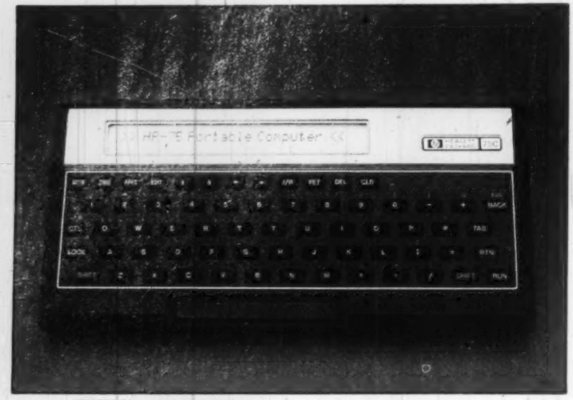
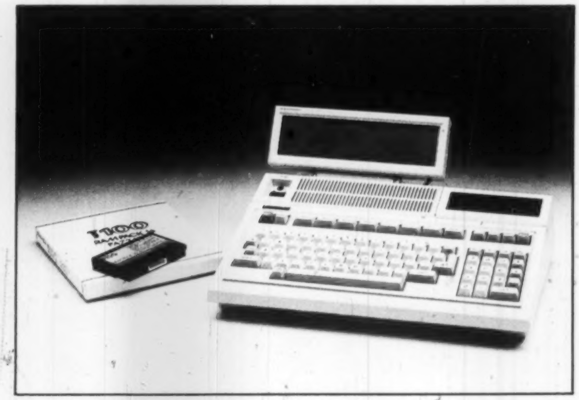


Hewlett Packard HP-75C



Toshiba T100

style keys. The spacebar is half the normal size, and there is only one SHIFT key, located below the Z. Thus, although it has a good feel, it is not suitable for rapid typing. However, for program editing, the cursor control keys are ideal, being oversize and laid out in a logical pattern.

The display has four lines of 20 characters each. Also, individual pixels can be addressed on the 32 x 120 screen. The X-07 also has a speaker capable of reproducing notes over four octaves.

Six peripherals are available for the X-07. A color plotter both prints and plots on 4½" wide paper in four colors. A compact thermal printer uses narrow (2¼") thermal paper. Three interface modules are available: one for RS-232 devices, one for a monitor or TV set, and another for interfacing to parallel devices such as Centronics-type printers, sensors, and synthesizers.

The last peripheral is an odd one; it is an infra-red optical coupler that permits two X-07 computers to communicate with each other. It makes a novel demonstration at trade shows, but we're not sure of what use it would be to the average user.

The Canon X-07 is a capable Basic-speaking computer in a compact package with a nice printer/plotter available. Support may be another issue. All of our testing of the X-07 was done in France and Japan where the Canon people were much more helpful than in the U.S. Buyers should hope that Canon will be more friendly to them than they are to the press.

Hewlett Packard HP-75C

The HP-75 is a very compact computer with unexpected speed and the highest accuracy of any computer we have ever tested—portable or desktop. It has a one-line display, but a monitor, as well as several other peripherals, are available.

At first glance, the keyboard appears to be much smaller than a standard one, but in fact is only 5% reduced. However, it uses calculator-style, short-travel keys and has a few keys in odd places; thus it is not suitable for rapid typing. A block of ten alpha keys can be specified as a numeric keypad for data entry.

Like earlier HP calculators, the HP-75 uses magnetic cards for program and data storage. Each card is 10" long and stores up to 1.4K. The cards must be pulled by hand through a slot on the lower right; it takes a bit of practice to get the hang of it, but the computer tells you if you have pulled it too fast or too slow.

The HP-75 uses a custom HP CMOS processor. It comes with 8K of RAM built in. Three slots on the front accommodate additional 8K RAM cartridges or ROM software cartridges. The machine can hold several programs which are accessed like a mini timesharing system. The HP-75 even has an Appointment Mode which can trigger one of nine different alarm sounds, a Basic program, or other action.

As expected, the HP-75 uses a dialect of HP Basic which is quite different from the DEC Basic, on which Microsoft Basic was modeled. Thus, string handling, functions, and PRINT USING (DISPLAY USING on the HP-75) are quite different from what much of the world regards as standard. Nevertheless, HP Basic is quite satisfactory and has several unexpected features such as powerful TRACE utility, recursive calls, and the ability to issue operating system commands from within a Basic program.

As might be expected, HP is converting programmable calculator application packages to the HP-75. Several engineering and financial packages have been released, and more are on the way. Even *VisiCalc* is available for the HP-75; with the single 32-character display line, it is less than satisfactory, but with the optional monitor hookup, it is fine. A word processing module has been announced, but we can't imagine doing serious text entry on the HP-75 keyboard.

The HP-75 uses an interface loop structure with each peripheral device daisychained in a continuous loop. Available peripherals include a digital cassette drive (fast and reliable), 24-column thermal printer, video interface (16 lines x 32 characters), plotter, 80-column dot matrix printer, and several laboratory device controllers.

The HP-75 is a fine computer system, particularly for a laboratory user or someone stepping up from a programmable calculator. It is well-engineered, has a good Basic (albeit a bit unusual), and a nice array of immediately available peripherals.

Toshiba T100

Unlike the other 13 machines in this roundup, the Toshiba T100 was not designed primarily as a notebook portable. Rather, it is the keyboard/system unit of an excellent desktop system to which attaches an eight-line LCD display and acoustic coupler to make it portable. It still needs AC power. Hence, it is primarily targeted at people who want to do all their computing on the same machine, but occasionally require computing capability away from the home office.

The T100 uses a Z80A running at 4 MHz; it was the fastest 8-bit machine we have tested to date. It has 32K of ROM and 64K of RAM built in. Two slots at the upper right accept ROM and RAM packs which are accessed from CP/M as disk drive E.

The keyboard is full-size with 89 full-stroke keys divided into a standard keyboard, numeric keypad, six special keys,

Teleram 3000

Radio Shack Model 100

and eight function keys (two user-programmable meanings each).

Three display connectors are provided, one each for a monochrome and RGB color monitor and one for the 8-line x 40-character LCD display. Individual pixels (64 x 240) can be addressed on the LCD display, a far cry from the spectacular 240 x 600 pixel resolution available on the color monitor.

For communications capability in either portable or stationary mode, the T100 uses the Lexicon LEX-12 modem, a 300-baud combination direct-connect/acoustic modem.

As mentioned, the T100 comes with CP/M 2.2 and Microsoft Basic in ROM. A disk, furnished with the portability package, scales the various menus to the LCD display and provides an assortment of utility packages. You can load any of these programs onto a RAM cartridge.

The T100 comes with an impressive array of bundled software including *Word Right, Magic Worksheet, MatheMagic, GraphMagic, Analyst, Q-Sort,* and *NAD.* Not all of these are suitable for use in the portable mode since several require disk operations.

The T100 has been on sale in Japan for over a year and is a proven performer. Toshiba offers a good array of peripherals including disk drives, monitors, printers, and a hardside carrying case for the cpu unit, display, and modem. The T100 should appeal to the user who wants, or can only afford, one computer; who needs an outstanding desktop machine; but who also needs limited away-from-home capability.

Teleram 3000

The Teleram 3000 was the first notebook portable introduced. It was targeted at large corporate users, and has found good acceptance in that market.

The 3000 is one of the largest notebook machines, weighing in at nine pounds. However, in this package, it has a full-size, full-stroke, completely standard keyboard; four-line by 80-character display; 128K of internal bubble memory (expandable to 256K); and CP/M operating system.

The 3000 has 64K of RAM; the one or two 128K bubble memory cartridges are accessed from CP/M like a floppy disk in drive A. The Teleram uses a CMOS version of the Z80; performance is similar to the four other machines using this configuration.

In addition to the standard alphanumeric keyboard, the 3000 has a numeric keypad to the right, eight programmable function keys with two meanings each, and several special keys.

Built into the 3000 are MBasic, several CP/M utilities, and a communications program called teleTalk. Microsoft Basic functions are as expected, although the graphics commands are not implemented; apparently the Teleram people couldn't imagine doing graphics on a 1.1" x 8.2" LCD screen—can't say as we blame them.

The teleTalk package is an especially rich communications package providing auto-dial, auto-answer, data capture, dump, and file transfer. Telephone numbers, passwords, commands, and log-on procedures may all be stored in command files. We were very impressed with the file transfer capabilities which allow all kinds of files, even CP/M .COM and text files, to be sent, received, and processed.

The Teleram 3000 has exceptional communications capabilities, a good Basic, and a standard operating system (CP/M) which opens the door to a large library of programs. Thus, the machine should have greatest appeal to the executive on the move, and the large company target audience of Teleram makes good sense.

Radio Shack Model 100

The story of the Radio Shack TRS-80 Model 100 is actually not the story of a TRS-80 at all. The machine was conceived by a small Japanese company, Kyoto Ceramics and first sold in Japan by NEC. Radio Shack designers worked with Kyocera to incorporate certain changes and additional features in the computer before introducing it in the American market. These changes were apparently "right," as few other computers have enjoyed such runaway sales success as the Model 100.

The Model 100 is truly notebook size (8.5" x 12" x 2.2") and weighs just under four pounds. It incorporates a full-size, full-stroke keyboard, with four special keys, eight function keys, and four cursor keys (in an unfriendly straight line).

The display is the largest on any notebook computer, 2" x 7.5", and displays eight lines of 40 characters each. The character size is large and legible. Graphics within a 64 x 240 pixel matrix are also possible. A built-in speaker plays notes over a five-octave range.

The Model 100 uses a CMOS version of the Z80 running at 2.5 MHz. Since default mode in Basic is double precision, the machine was very slow in running our benchmark; on the other hand, it scored high in the accuracy department. It has only 8K of RAM built in, but a 24K version is available. Both can be further expanded to 32K. An external cassette recorder provides mass storage.

The computer provides an impressive array of I/O ports. On the back are connectors for Centronics parallel printer, RS-232 serial device, cassette recorder, bar code reader, and modular telephone jack.

The Model 100 has a built-in direct-connect modem which can plug into any telephone jack. Coupled with the communications software package, it pro-

NEC PC-8201

Epson HX-20

vides many of the features of a so-called "smart" modem—auto-dial, log-on, download, and upload—although it does not have wake up and auto-answer.

The Model 100 has five programs built in. Microsoft Basic is missing a few commands and does not have on-screen editing (except by means of the text editor, a cumbersome process). The text editor is an adequate package. It is always in insert mode, and has cut, paste, search, and other rudimentary features. It does not have an output formatter, but several are available from third party vendors.

The communications package was mentioned above. The last two packages, schedule organizer and name/address organizer, are simply special versions of the text editor with certain commands locked out. We have not found them particularly useful.

Many software packages have been introduced already by third party vendors, and much more is on the way. The availability of software coupled with the integrated packages built into the machine make the Model 100 an attractive choice for a wide variety of users. Poor Basic program editing and lack of an output formatter are small drawbacks against the many enticing capabilities of the computer coupled with an attractive price.

NEC PC-8201

We have frequently called the NEC PC-8201 the twin of the Radio Shack Model 100. Strictly speaking, this is not true. The 8201 was born six months or so earlier in Japan and is a somewhat different version of the Kyoto Ceramics original.

The 8201 is slightly larger than the Model 100 as a result of providing a slot in the left side for an expansion memory cartridge. The 8201 can have from 16K to 64K of RAM in the basic machine. The 32K plug-in memory cartridges function as a switchable bank of main memory, rather than a disk drive as on some other machines.

The 8201 has a full-size, full-stroke keyboard with two special keys, five function keys (two programmable meanings for each), and cursor control keys laid out in a logical diamond pattern. Graphics characters are not built into the 8201 as they are on the Model 100; instead any desired graphics characters can be entered by the user with a short included utility program.

The display is 2" x 7.5" and displays eight lines of 40 characters each. The version of Microsoft Basic on the NEC has the LOCATE command not found on the Model 100, so characters as well as individual pixels (64 x 240) can be addressed. The Basic on the NEC also has on-screen editing and RENUM, both lacking in the Model 100 implementation.

In addition to Basic, the 8201 has a text editor (but no output formatter) and telecommunications software package (but no built-in modem). The 8201 also comes with a cassette tape of 16 utility and demonstration programs—a desirable extra.

The 8201 has output connectors for Centronics parallel printer, RS-232 serial device, bar code reader, modem, and cassette recorder. The literature promises a floppy disk interface, but we have been unable to get any information on it.

For an attractive price, the NEC PC-8201 offers a great deal of capability—Basic computations, word processing, and communications, with RAM cartridges for external storage. The machine should have appeal for a wide cross section of people needing a true portable computer.

Epson HX-20

The Epson HX-20 was the first true notebook size computer introduced. Unfortunately, lack of availability prevented it from being a runaway success when it was introduced in late 1982. Now that it is widely available, it no longer has the market to itself and will have to carve out a smaller niche among a tough field of competitors.

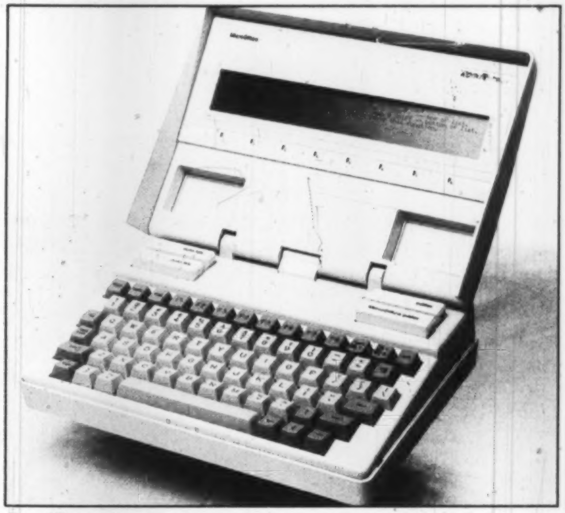
Several reviewers have looked at the small screen size of the HX-20 and concluded that it is not competitive with the later entries sporting screens four to eight times larger. We think that is unfair, as the HX-20 still offers a wide array of features, some of them unique in a machine this size.

The Epson is slightly thinner than the Model 100, but weighs the same 3.8 pounds. It has a full-stroke, standard size keyboard with an excellent feel. Along with the 54-key QWERTY keyboard, it has seven special keys and five function keys, each with a dual meaning. The main disadvantage is that there are only two cursor control keys; the other two directions are gotten by pressing shift with one of the two keys. Although Basic has on-screen editing, using just two keys is a pain.

The LCD screen displays four lines of 20 characters each. The display is actually a window onto a much larger virtual screen; the size can be specified by the user. Hence, it is possible to scroll in both directions. Pixel and character addressing are possible within the 32 x 120 pixel dimensions of the screen. A small speaker can produce tones over a four-octave range.

The HX-20 uses a CMOS version of the Z80 mpu. It has 32K of ROM and 16K of RAM, expandable to 32K with an external module. Mass storage is provided in the form of a built-in microcassette recorder. We found this to be fast and reliable. An external cassette can also be used.

The HX-20 provides I/O connectors for RS-232 serial devices, bar code reader, cassette recorder, and a 38,400-



RoadRunner

Sharp PC-5000

baud serial link to other devices via an interface module which has yet to be released.

On the top left of the case is a built-in printer. It uses plain paper rolls 2¼" wide and prints in black or purple. It is this printer that makes the small screen size tolerable as programs or text can be printed out in rough form for correction and then printed later on a full-size printer or transmitted to another machine.

The NiCad rechargeable battery on the HX-20 provides 50 hours of use, considerably more than any of the other notebook portables.

Built into ROM is a rudimentary monitor, Microsoft Basic, and *SkiWriter,* a word processing package. Basic is a complete implementation with no obvious omissions. Up to four Basic programs can be stored simultaneously in the machine. Many more, of course, can be stored on tape.

SkiWriter is an adequate, if not extensive, word processing package. It can operate in either insert or overstrike mode and has block copy and delete. It will search for a string, but will not search and replace automatically. Print formatting is barely adequate, as it requires that you put page breaks into the text rather than producing them automatically.

Epson has announced a wide array of plug-in ROM software packages, but we have not seen them at the retail level yet. The communications and spreadsheet packages should enhance the appeal of the machine considerably.

The HX-20 with built-in printer and optional microcassette offers a great deal of computing power at a moderate price. The long battery life between charges is a nice plus. The machine should appeal to people needing a full-feature Basic and occasional word processing. Additional software packages should help it carve out a niche with specific types of users.

RoadRunner

The MicroOffice RoadRunner is one of the latest entries in the notebook computer sweepstakes. Currently, it is being marketed primarily to OEMs and large-volume end users, but it may be available by mail order and in a limited number of retail computer stores.

The RoadRunner is equal in size to a large binder and weighs in at five pounds. When it is opened, it comes to life with a small beep and initial dialog on the display.

The LCD screen measures 1.3" x 9.3" and displays eight lines of 80 characters, about the size of a dot matrix printer. Graphics can be displayed on the 64 x 480 pixel screen. The display tilts, but unfortunately does not have a contrast adjustment.

The keyboard is a full-size, full-stroke unit with sculpted concave keys. Although close to a standard layout, it has several keys in unexpected locations. Most users will probably adjust in a week or two. The cursor keys are laid out in a logical pattern, an oversight on too many notebook portables. Six special keys and eight dual-meaning function keys are found in the top row above the standard QWERTY keyboard.

The RoadRunner uses a CMOS version of the Z80 mpu and has 16K of ROM and 48K of RAM. Four memory cartridge slots are found over the keyboard for extra RAM memory and ROM software cartridges. These are addressed from the CP/M-compatible operating system as devices A through D.

I/O connectors are provided for RS-232 serial devices, a modem module, and the main bus of the computer. The modem is a 300-baud direct-connect unit with auto-dial, auto-answer, and a wake-up mode of operation. In addition, the RoadRunner has a built-in terminal mode which emulates a DEC VT100 terminal.

Also built in is a schedule organizer, name/address organizer, and, of course, the CP/M operating system. Available on cartridge is a full-feature word processing package with features such as character, word, and line delete, and global search-and-replace.

Cartridges are also available with Microsoft Basic (with everything but on-screen editing) and Sorcim *SuperCalc.* More packages are promised in the future.

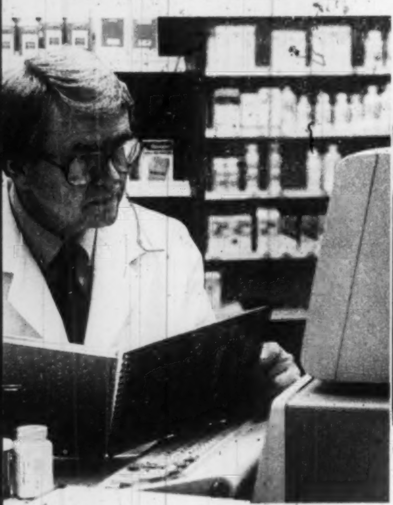
With its excellent communications, word processing, Basic, and spreadsheet software on a machine with full keyboard, large display, and plug-in memory cartridges, the RoadRunner is sure to find a market with executives, sales people, and writers who need a portable office on the road.

Sharp PC-5000

The Sharp PC-5000 is one of the largest of the notebook computers, but it is packed with features and capability. It has a large screen (eight lines by 80 characters), full keyboard, 16-bit processor, 128K memory, and much more.

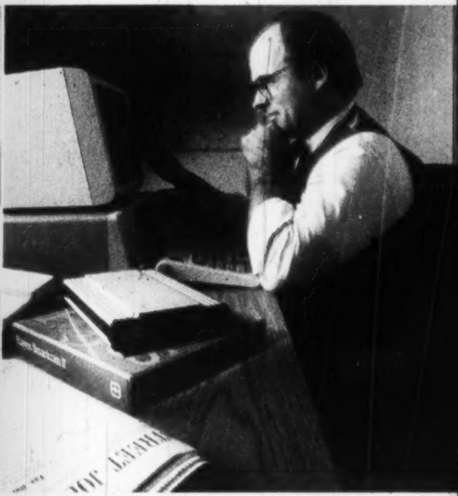
The PC-5000 uses a 16-bit 8088 mpu, the same as in the IBM PC. MS-DOS

Your computer's telephone. Hayes™



What will counteract NDC 74-0054-60?

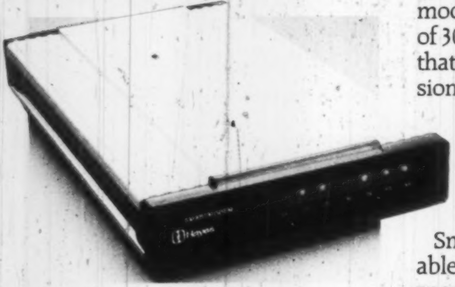
Gary: The pedigrees for next week's auction are as follows...



Sold 1000 shares at 33 for net profit of 6000. Richard.

Wouldn't it be great if you could use your IBM®PC to tap into vast resource libraries across the country? To transfer files to your partner, upstate? Or from your broker, down the street?

It's possible. All you need is a modem, to connect your computer to others. Down the hall. Or thousands of miles away.



Hayes Smartmodem. Think of it as your computer's telephone. Hayes Smartmodem 300,™ and the faster Smartmodem 1200,™ allow you to communicate over ordinary phone lines.

But any modem will send and receive data. Smartmodems also dial, answer and disconnect calls. Automatically. And without going through the telephone receiver, making them far superior to acoustic coupler modems.

Choose your speed; choose your price. The lower-priced Smartmodem 300 is ideal for local data swaps and communicates at 300 bps. For longer distance and larger volumes, Smartmodem 1200 operates at baud rates of 300 or 1200, with a built-in selector that automatically detects transmission speeds.

Both work with rotary dials, Touch-Tone® and key-set systems; connect to most time-sharing systems; and feature an audio speaker.

Smartmodem 1200B™ is also available as a plug-in board. Developed specifically for the PC, it comes packaged with Hayes' own communications software, Smartcom II.™

Smartcom II. We spent a lot of time developing it, so you can spend less time using it. Smartcom II prompts you in the simple steps required to create, send, receive, display, list, name and re-name files. It even receives data completely unattended—especially helpful when you're sending work from home to the office, or vice versa.

If you need it, there's always "help." This feature explains prompts, messages, etc. to make communicating extra easy.

With Smartcom II, it is. Case in point: Before you communicate with another system, you need to "set up" your computer to match the way the remote system transmits data. With Smartcom II, you do this only once. After that, parameters for 25 different remote systems are stored in a directory on Smartcom II.

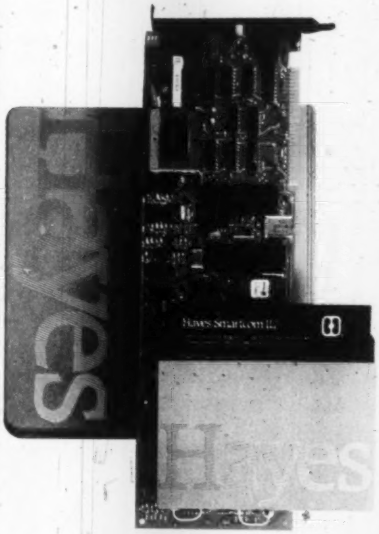
Calling or answering a system listed in the directory requires just a few quick keystrokes.

You can store lengthy log-on sequences the same way. Press one key, and Smartcom II automatically connects you to a utility or information service.

Hayes®

Smartmodem 300, 1200 and 1200B are FCC approved in the U.S. and DOC approved in Canada. All require an IBM PC with minimum 96K bytes of memory; IBM DOS 1.10 or 1.00; one disk drive; and 80-column display.

Smartmodem 1200B. (Includes telephone cable. No serial card or separate power source is needed.)



Smartcom II communications software.

NOTE: Smartmodem 1200B may also be installed in the IBM Personal Computer XT or the Expansion Unit.
In those units, another board installed in the slot to the immediate right of the Smartmodem 1200B may not clear the modem; also, the brackets may not fit properly. If this occurs, the slot to the right of the modem should be left empty.

And, in addition to the IBM PC, Smartcom II is also available for the DEC Rainbow™ 100, Xerox 820-II,™ and Kaypro II™ personal computers.

Backed by the experience and reputation of Hayes. A solid leader in the microcomputer industry, Hayes provides excellent documentation for all products. A limited two-year warranty on all hardware. And full support from us to your dealer.

So see him today. Break out of isolation. Get a telephone for your personal computer. From Hayes.

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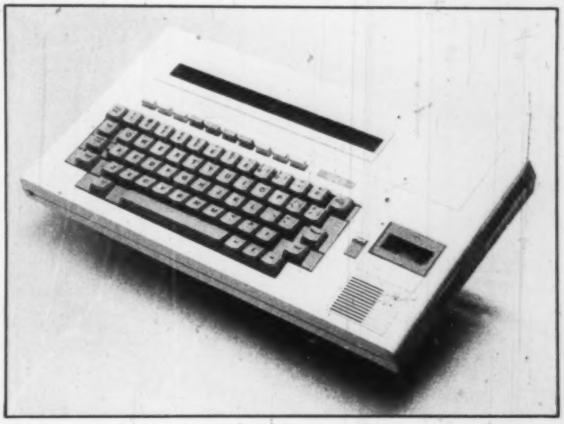
CIRCLE 162 ON READER SERVICE CARD

14 Computers, continued...



Xerox 1810

and Microsoft GW (Gee Whiz) Basic reside in 64K of ROM, and 128K of RAM is available for user memory, expandable to 256K. Mass storage is in the form of a 128K bubble memory cartridge or, if you prefer, an external cassette recorder. In a non-portable mode, the PC-5000 also supports a double-density, double-sided floppy disk drive.

With the 16-bit processor, the PC-5000 is fast—close to the fastest computer we have ever tested, portable or not. A second control mpu controls the I/O functions, further contributing to the throughput.

The LCD screen measures 1.3" x 9.3" and displays eight lines of 80 characters or graphics in an 80 x 640 pixel field. Characters are about the same size as dot matrix printer output—small, but readable.

The keyboard has 57 full-stroke keys, three special keys, eight dual-meaning function keys, and four cursor control keys (laid out in a straight line, unfortunately). The keys are concave sculpted, and have a good feel, except for a slight "give" in the center of the keyboard.

Connectors are provided for a cassette recorder, external bus, RS-232 serial device, and modem. The modem is an option with the PC-5000 and fits into the lid of the case. It is a 300-baud, direct-connect unit with an auto-dial, redial, and conference phone capability. It is supported by the *SuperComm* software package by Sorcim.

Another optional extra which fits in the basic unit is an 80-column thermal printer which can print on plain paper as well as on thermal paper. It is a 30 cps unit that produces excellent type (and dot graphics) in a variety of formats.

Software is available on bubble memory cartridges or on disk. In addition to the built-in MS-DOS and Microsoft GW Basic, external software includes *SuperWriter*, an excellent menu-driven word processing package by Sorcim; *SuperCalc-2*, a spreadsheet package; and *SuperComm*. Many other software houses are said to be working to fit their packages on the PC-5000.

The PC-5000 is an outstanding, full-featured computer with a variety of excellent software backed up by some innovative serving arrangements. As such, it should find enthusiastic acceptance by a wide cross section of business people and other people on the move who need full-function computing power.

Xerox 1810

The Xerox 1810 is a notebook portable designed by Sunrise Systems. It is sold (by them) only to OEMs. Currently, the only OEM actively marketing the system is Xerox; from them it is known as the Xerox 1800. It is likely to be available from other vendors in slightly different configurations in the near future.

Like the Toshiba T100, the 1810 is the keyboard, cpu, and system unit of a desktop computer, although the LCD display is built in. The machine can be customized to the particular needs of an individual vendor, thus some vendors may offer it as a desktop unit with portable cpu, and others may offer it just as a notebook portable. Xerox offers both the 1810 keyboard unit plus an optional 1850 "Flat Pack" processor.

The processor is a CMOS version of the Z80 with 32K of ROM and 16K of RAM, expandable to 64K. In the desktop configuration, the unit contains a dual 16-bit 8088 and an 8-bit Z80 plus additional memory. Mass storage in the portable mode of operation is provided by a built-in microcassette recorder to the right of the keyboard. This stores 512K of digital information and also doubles as an audio recorder.

The keyboard has 63 full-stroke keys in a more or less standard layout. The

Gavilan

cursor control keys are arranged logically, although the up cursor key is where you might expect to find the question mark on the bottom row. A row of special and programmable function keys is over the regular keyboard.

The LCD display is available in two versions: six lines by 40 characters or three lines by 80 characters. For some inexplicable reason, Xerox chose the latter configuration for the 1810. Individual pixels are addressable, although hardly useful in the 3 x 80 layout (24 x 480 pixels). The unit also provides a signal for a monitor.

A direct-connect 300-baud modem, supported by a dumb terminal software package, is built in. An interesting telephone program lets the computer be used as an answering machine, and provides auto-dial, redial last number, hold, and speakerphone capabilities.

I/O connectors are provided for RS-232 serial devices, Centronics parallel printer, telephone, and RGB or monochrome monitor.

A vast array of software is available and under development. Built in is CP/M, a calendar/scheduler, and four-function calculator. Software on plug-in ROM cartridges includes Microsoft Basic, typewriter/note taker (a word processing package), a terminal program, and the telephone program mentioned above.

The Xerox 1810 is a state-of-the-art machine with a wide array of software and easy access to much more as a result of the CP/M operating system and communications capability. We will be anxious to see how Xerox (and other vendors) target it.

Gavilan

When the Gavilan was first shown at NCC in June 1983, many people wondered out loud whether it could really be made. It was just too much state-of-the-art stuff in one package for people to swallow. Now, that it is nearing readiness for the market and now that competitors are leaping in from all directions, the Gavilan looks more real than it did six months ago. But it still has an air of unreality.

The Gavilan is remarkably compact (11.4″ square x 2.7″ high) and weighs just nine pounds. Its optional, snap-on printer adds four inches and four pounds to the package. It has a 16-bit mpu, 64K of RAM, built-in 3″ floppy disk, eight-line display, full keyboard, and a unique touch panel in which your finger becomes sort of an electronic mouse.

The Gavilan uses a 16-bit 8088 mpu, 48K of ROM, and 64K of RAM, expandable with up to four 32K plug-in capsules of blank memory or applications software packages. Also built in is a 3″, 320K Hitachi floppy disk drive. Traffic cop chips turn off the power to the disk drive or mpu whenever it is not needed; thus the NiCad batteries provide eight hours of operation. Eighty percent of the charge can be restored in one hour on the charger.

The keyboard is a standard-size, full-stroke unit with 13 special keys to the right. Several keys are in "unusual" locations, especially the enter key next to the spacebar, but it shouldn't take too long to get used to it.

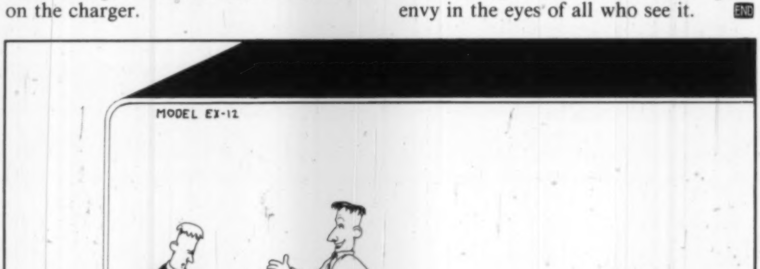
The most unusual feature of the Gavilan is the touch pad below the display. This lets you manipulate objects on the screen by pointing at them. A quick movement of your finger moves the cursor a long way while a slow movement gives you fine control. Like Apple's Lisa system, pictorial representations of objects such as file drawers, file folders, documents, and a trash basket are shown on the screen.

Although the screen is capable of displaying eight lines of 80 characters, in most cases, part of the screen will be devoted to menus in "windows" appropriate to the software package currently in use. This loss of a portion of the screen makes one wish mightily for a screen three times as large. At home base your prayers are answered, since the Gavilan provides standard video output to a monochrome monitor.

The Gavilan has a built-in 300-baud direct-connect modem supported by a comprehensive software package. It also has interfaces for the optional printer, a second disk drive, RS-232 serial device, and video output.

Besides MS-DOS, MBasic, and the communications software, Gavilan makes available an Office Pack of four applications, Sorcim *SuperCalc* and *SuperWriter,* and *PFS File* and *Report.*

All in all, the Gavilan offers as much or more than most desktop systems. It is a full-function computer with few trade-offs. All this comes at a price, but for the traveling professional this is a machine that is easy to learn and exceptionally user-friendly, and one that will spark envy in the eyes of all who see it. END

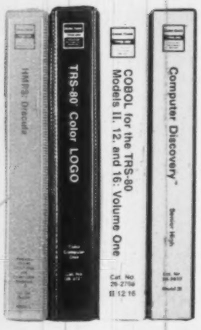


"... and once you're ready to use this computer with software all you'll need is the expansion module."

CIRCLE 191 ON READER SERVICE CARD →

Radio Shack® Educational Software Catalog
1984

Careers in Computing
Basic Illustrated History of America
CORP. PLAN
A Business Simulation Program
A Computer Assisted Instruction Program Designed by Professional Educators for Reinforcement and Learning in the Classroom
TRS-80 COBOL
ASTRONOMY
Radio Shack TRS-80 Science Information Series
GALILEO'S REFRACTING TELESCOPE
PLAY WITH LANGUAGE
TRS-80 Color LOGO



Radio Shack's Commitment to Education

We Meet Your Total Classroom Computing Needs

Radio Shack's TRS-80® microcomputer is a valuable teaching tool widely used in schools nationwide. We have a major commitment to support educational uses of the TRS-80 by producing a growing list of instructionally-sound courseware. We provide training and support, including free computer training classes, courseware manuals designed for educators who have never worked with a computer, and 25 Regional Educational Coordinators.

A Wide Selection of Field-Tested Programs

Radio Shack involves the experts—teachers, curriculum developers and administrators—in designing and field-testing our complete line of TRS-80 courseware. Compare our courseware with other programs currently available. You'll see what a difference a commitment to quality can make.

TRS-80 Reading Courseware for Your Classroom

CW
Picture Place
Bagasaurus
Roll-a-word

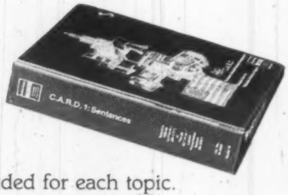
Children's Computer Workshop Educational Packages

These superb courseware packages were designed by Children's Computer Workshop. CCW is an activity of Children's Television Workshop—the creators of Sesame Street®. The packages are for use with first and second graders, and require a TRS-80 Color Computer disk system. Each package includes diskettes, teacher's guide, game boards, posters, spirit masters and activity cards.

Play-With-Language™ (Cat. No. 26-2538, $99) consists of three word and reading activities that combine graphics and text to teach sight and vocabulary words, decoding skills, and comprehension skills. **Hands On!**™ (Cat. No. 26-2639, $99) encourages self-expression with the computer. The first activity lets students write with beginning word processing aids. With the second activity, children create and manipulate pictures in ways unique to computer art.

Computer Assisted Reading Development

C.A.R.D. I: Sentences and **C.A.R.D. II: Paragraphs** are adapted from the successful Philadelphia Computer Assisted Reading Development Program. They are written at a 4 to 8-grade level for students with reading problems. TRS-80 AUTHOR I Lesson Presentation Package (26-2707) or TRS-80 AUTHOR I (26-1727) and a Model III or Model 4 disk system are required. Network 3 compatible using the TRS-80 Network 3 AUTHOR I Lesson Presentation Package (26-2713).



C.A.R.D. I: Sentences (*26-2603, $199) covers sentence recognition, relationships, ordering, and labeling. Pre- and post-tests included for each topic.

C.A.R.D. II: Paragraphs (*26-2604, $199) provides reading development lessons to increase comprehension skills. The lessons help students define sentence relationships within a paragraph through recognition of general and specific topics, details and topic sentences. Pre- and post-tests included.

Reading Series

HMRS Dracula
High Motivation Reading Series

The programs in our **High Motivation Reading Series** are written for grade levels 4–6 and are accompanied by four student readers and a read-along audio tape. Comprehension, spelling and vocabulary exercises included. HMRS programs require a Model III or Model 4 disk system and TRS-80 MicroPILOT™ (26-2718).

Select **Charles Lindbergh/Amelia Earhart** (*26-2513, $74.95), **The Hound of the Baskervilles** (*26-2514, $69.95), **Dracula** (*26-2515, $69.95), **Moby Dick** (*26-2516, $69.95), **The Beatles** (*26-2517, $69.95), **20,000 Leagues Under the Sea** (*26-2518, $69.95), **Time Machine** (*26-2519, $59.95), **Frankenstein** (*26-2520, $59.95), and **HMRS Student Records System** (26-2521, $29.95).

Introduction to the Alphabet (*26-1718, $39.95) helps 4 to 6 year-olds learn the alphabet and computer keyboard. Available on cassette or disk for Model III or 4.

Enlighten Your Students With Our History Packages

Radio Shack's **Basic Illustrated History of America Learning Unit** (26-2645, $299) includes twelve illustrated books on American history—from 1500 to the 1980's. Read-along audio tapes and computer activities diskettes are included. TRS-80 AUTHOR I Lesson Presentation Package (26-2707) or TRS-80 AUTHOR I (26-1727), and a Model III or 4 disk system required. Network 3 compatible using 26-2713 (page 5).

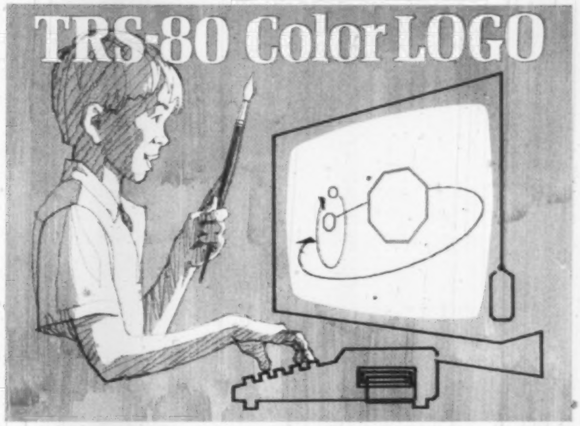
Basic Illustrated History of America
Learning Unit

Our **History of Technology** packages use colorful graphics, text, sound effects and recorded speech. Each package includes four lessons with student interaction and feedback messages. The 16K Color Computer, a TV and cassette recorder are required.

Pioneers in Technology (26-2624, $94.95) includes The Age of Flight, Space Exploration, The Electric Car, and History of Computers. **Inventions That Changed Our Lives** (26-2625, $94.95) includes Edison's Electric Inventions, Bell and the Telephone, The Story of Railroads, and The Age of Television.

***Network 3 compatible**

Our Colorful Programming Language For Learning



Our Color LOGO programming language is designed to help students grasp fundamental programming concepts. Through manipulation of a "turtle" on the screen, students learn to program. The computer becomes a friendly learning tool, and students gain valuable insight into advanced mathematical, geometric and logical concepts. In addition, Color LOGO is versatile. Children under reading age can use Color LOGO's "doodle" mode to create their own graphics using predefined one-key commands. For older children, Color LOGO features a "hatch" command which allows creation of multiple turtles that are capable of running separate programs simultaneously. Our **Disk Color LOGO** (26-2721, $99) requires a 32K Extended BASIC Color Computer and disk drive. The **Program Pak™ Color LOGO** (26-2722, $49.95) requires a Standard BASIC Color Computer. Use your own TV with either version.

Our **Color LOGO Teacher's Book** (26-2761, $3.95) gives you instructional ideas and activities for presenting LOGO in the classroom. It includes special pages that can be photocopied and used as class handouts.

The **Color LOGO Parent's Book** (26-2763, $3.95) is designed for parents and children to learn LOGO together at home.

Color LOGO Lab (26-2770, $199) provides a complete guide for teaching Color LOGO. Includes teacher's manual, student workbooks and overhead transparencies. **Additional Student Workbooks** (26-2771, $2 each) are available.

Radio Shack Makes Courseware Development Easy

Color PILOT
TRS-80 AUTHOR I

Our authoring systems make it easy to create courseware. No programming knowledge is required. Each program requires a Model III or Model 4 disk system.

TRS-80 AUTHOR I (26-1727, $149.95) is a screen-oriented authoring system with full-screen editing, graphics and score-keeping option. Sample lesson included.

TRS-80 AUTHOR I Lesson Presentation Package (26-2707, $64.95) presents lessons that have been created using TRS-80 AUTHOR I. (Not required if you have TRS-80 AUTHOR I).

TRS-80 Network 3 AUTHOR I Lesson Presentation Package (26-2713, $299) allows you to use the Network 3 Controller to present lessons created with TRS-80 AUTHOR I. Keep a lesson score file on diskette. Requires host computer with two disk drives.

TRS-80 MicroPILOT™ (26-2718, $119.95) is a command-oriented language that lets you create your own courseware or adapt it from any curriculum suitable for computer assisted instruction. MicroPILOT is based on the PILOT computer language, but offers extended graphics and disk file handling capabilities. Features one-letter commands, upper and lower case characters and branching. Requires a Model III or Model 4 disk system.

Color PILOT lets you mix text and high-resolution graphics. It features a line editor and easy one-letter commands. Graphics operators include color, line, box, window and more. Display options include upper and lower case characters. **Disk Color PILOT** (26-2710, $79.95) requires an Extended BASIC Color Computer with disk drive. **Tape Color PILOT** (26-2709, $59.95) requires a Standard BASIC Color Computer. Use your own TV with either.

Quick Quiz: A Mini-Authoring System (26-1728, $39.95) makes it easy to create, store, and give multiple-choice tests. It provides a pre-designed format for typing up to 40 questions with four answer choices per question. Scores can be printed or stored on disk. Requires a Model III or Model 4 disk system.

Helpful TRS-80 Educational Resource Materials

The second edition of our **TRS-80 Educational Software Sourcebook** (26-2764, $6.95) is a complete guide for educational courseware for TRS-80 computers. It contains over 1200 vendor-furnished listings of programs classified under 14 subject areas. Each listing gives program content, grade level, instructional technique used, and hardware required. Many listings contain usersite references. Also includes publisher profiles.

The **TRS-80 Microcomputer Information Handbook for Educators** (26-2757, $2.50) describes what microcomputers and courseware are, and how they can be used.

Radio Shack's Proposal Writing Guide (26-2754, $9.95) is a guide for educators who want to write proposals for funding from an outside source for computer-related education projects.

My TRS-80 Likes Me (26-2751, $2.50) is a teacher's guide to helping elementary students understand BASIC.

Number Patterns (26-2752, $2.50) shows how to introduce sequences and series using computers.

Math, Science and Business Courseware

Volume One
Radio Shack K-8 Math Program

K-8 Math Series

This series of programs supplements regular classroom math instruction in Kindergarten through eighth grades. Each program includes lesson summaries and a K-8 Math Cross-Reference to six of the most commonly-used math basals.

The **K-8 Math Program, Vol. I** (*26-1715, $199) provides randomly generated drill and practice problems in number concepts, addition, subtraction, multiplication and division. A Model III or Model 4 cassette system is required.

The **K-8 Math with Student Management, Vol. I** (*26-1725, $199) combines the K-8 program with a student management capability to monitor promotions and demotions, allow for teacher review of scores, and begin each student in the appropriate lesson each session. A Model III or Model 4 disk system is required. Printer is optional.

The **K-8 Math Worksheet Generator** (26-2162, $99.95) prints worksheets and answer sheets from K-8 Math lessons. Worksheets can be saved on disk. A Model III or Model 4 disk system and TRS-80 line printer are required.

Help Prepare Students for the World of Business

Our **Corplan**™ business simulation program (*26-2619, $49.95) gives instructors an effective way to demonstrate the many facets of business management. Corplan realistically simulates the operations of a company. Designed for use by the advanced secondary or college-level student, Corplan requires no previous knowledge of computer operation or business programs.

Corplan puts a player or a team of players in control of an imaginary corporation. Students have the responsibility of planning quarterly production, and making sales and financial decisions that will make or break the company. The computer keeps track of each quarter's decisions, calculates immediate results, gives immediate feedback such as "cash shortage", "plant congestion" or "bankruptcy", and maintains the books through a maximum of 12 quarters. Corplan also displays complete accounts and balance sheets. An easy-to-use auxiliary program lets the instructor modify the parameters of the game to create different business situations or to set new challenges for the student.

Corplan requires a Model III or Model 4 disk system. An optional printer can be used to produce copies of the program's charts and reports.

Sharpen Your Students' 10-Key Skills

Our **Numeric Data Entry Practice** (*26-2601, $39.95) is a 25-lesson practice course to help students develop speed and accuracy in the 10-key entry of numeric data. Using the TRS-80 standard numeric keypad, students "key in" numbers, and the computer graphs and records performance. It requires a Model III or Model 4 disk system. Printer is optional.

Secondary Math and Science

The Solar System: Featuring the Discovery of the Planet Pluto (26-2647, $59.95) combines high-resolution graphics and recorded speech to present facts about the planets. A 16K Color Computer, TV and cassette recorder are required.

Our **Essential Math Program, Vol. I and II** are drill and practice programs for grades 7-12 and are available on cassette or disk for Model III and Model 4. **Essential Math, Vol. I** (*26-1716, $199) includes exercises in addition, subtraction, multiplication, division, and more. **Essential Math, Vol. II** (*26-1719, $199) covers fractions, decimals and percents, and pre-algebra concepts.

Euclid Geometry Tutor (*26-1724, $39.95) allows students to practice constructing proofs using nine basic postulates.

Advanced Graphics (*26-1714, $39.95) gives practice in analyzing equations, and plots graphs of functions and polar and parametric equations.

Vector Addition (*26-1720, $39.95) illustrates and plots components and sums of student-provided vectors. **Vector Addition for the Color Computer** (26-2638, $39.95) requires Extended BASIC and is available on cassette or disk.

Interpreting Graphs in Physics: Position and Velocity vs. Time (*26-1721, $39.95) poses graph-related questions.

Graphical Analysis of Experimental Data (*26-1722, $39.95) plots data pairs that the student inputs.

Investigations in Integral Calculus (*26-2600, $39.95) graphs and computes areas of functions. **Investigations in Integral Calculus for the Color Computer** (26-2641, $39.95) requires Extended BASIC and is available on cassette or disk.

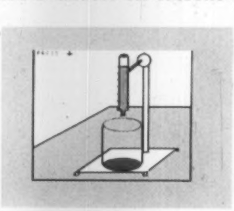
Plane Analytic Geometry (*26-2602, $39.95) includes problems on straight lines and conic sections.

Number Theory (*26-2613, $69.95) includes definitions, examples and exercises on number theory concepts.

Matrices, Determinants, and Simultaneous Equations (*26-2620, $49.95) generates problems related to simple matrix algebra.

Quadratic Equations (*26-2623, $49.95) covers coefficient recognition, discriminate evaluation, type of roots, and more.

Not including Color Computer programs, the above programs are available on cassette or disk for Model III and Model 4.



Electronic Chemistry Lab

The **TRS-80 Chemistry Lab** uses graphics and equations to simulate chemical reactions. Students control variables for six topics.

TRS-80 Chemistry Lab, Vol. I is available on cassette or disk for Model III and Model 4 (*26-2609, $199), and on cassette for the Color Computer with Extended BASIC (26-2626, $199). **Additional Student Experiment Books** (26-2666, $3 each) are available.

***Network 3 compatible**

TRS-80 Shared Learning Systems

A **TRS-80 Network Controller** lets you implement a shared learning system—up to 16 non-disk student stations connected to the teacher's disk, or "host" computer. Students can access programs from disk with low-cost TRS-80 non-disk computers. The teacher can send programs to the student computers, and student work can be saved on the teacher's diskettes. Your computer lab requires less duplicate courseware because several students share the same software. In addition, we offer a choice of two controllers to meet your particular networking needs.

The **Network 3 Controller** (26-1212, $599) enables up to 16 non-disk Model III or Model 4 student workstations (with RS-232C interfaces) to select and access lessons stored on the teacher's Model III or Model 4 disk system. As a result, the teacher is freed from repeatedly loading programs. Under software control, scores can be stored on the host disk. An optional line printer attached to the host computer lets students get printouts of their programs without teacher assistance. Network 3 is designed for use with the educational software packages indicated in this catalog by an asterisk (*). Connecting cables available separately. Requires Network 3 Operating Software (below).

Network 3 Operating Software (26-2775, $149) supports the Network 3 host and its student stations with many of the capabilities of TRSDOS and Disk BASIC. Students can SAVE and LOAD programs to and from the host disk.

Radio Shack's **Network 2 Controller** (26-1211, $499) enables up to 16 non-disk student stations to be connected to the teacher's host computer using the cassette ports. The teacher can down-load programs to all stations simultaneously, or upload programs from individual stations. With an optional printer connected to the host computer, student programs can be loaded into the host and printed out. The Network 2 Controller can be used with a Model III or Model 4 disk and non-disk computers; with Color Computer disk and non-disk systems; or with the Model 100 computer. And now the Network 2 Controller can be used with our MC-10 Micro Color Computer. Use an MC-10 or Color Computer as host and MC-10s as student stations. (MC-10 programs cannot run on the Color Computer, but they can be loaded and saved using tape or disk). Controllers can be cascaded to connect more stations. All cables are included.

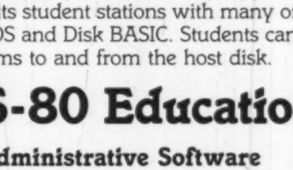
Our TRS-80 Education Management Systems

TRS-80 School Administrative Software

The **Student Information System** (26-2729, $249) helps school administrators simplify the burden of record-keeping. Schools can easily collect, record, update, retrieve and distribute student data. A special inquiry feature lets you enter criteria into the computer and print a list of all students meeting those criteria. Address labels for students or parents can also be printed. The Student Information System requires a TRS-80 Model II or Model 12 computer with one floppy disk drive and a hard disk, or a Model 12 with two floppy disk drives.

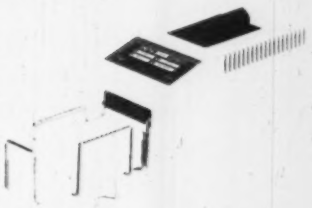
Additional modules for attendance, grades and scheduling will soon be available. These programs, the Student Information System and the CR-510 Card Reader (right) will allow administrators to compile and analyze large amounts of data.

Football Analysis



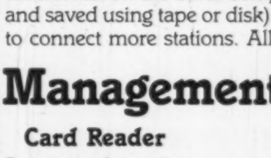
Store and analyze scouting information on your opponent's offense with **CHAMPS**™ (26-2703, $149.95). Designed for high school and college levels, CHAMPS provides various charts and statistical reports. Includes ten CHAMPS Scouting Manuals. **Additional Scouting Manuals** (26-2708, package of 10 for $39.95) are available. Requires a Model III or Model 4 disk system and a 132-column printer.

Card Reader



Automate data compilation, evaluate surveys and polls, or correct multiple choice tests with the new **CR-510 Card Reader** (26-1266, $1595). It provides single, demand or continuous feed operation, reads marked or punched cards, and is controlled through manual switches or software. The CR-510 includes a diskette with COBOL and BASIC driver routines, and requires a TRS-80 computer with RS-232C port. Cables available separately.

Get Quick Access to Student Data



REKORD Planner is a data management system adaptable to your own needs. A program and tutorial diskette, plus sample formats are included. Choose from **Administrator's Version** (26-2725, $499), **Counselor's Version** (26-2726, $499) and **Special Programs Version** (26-2727, $499). A Model III or 4 disk system is required.

Radio Shack's Computer Education Series

BASIC Programming

These complete classroom packages for secondary and post-secondary levels include overhead transparencies, a teacher's manual and 25 student workbooks.

Part 1: Introduction to BASIC (26-2150, $220) introduces students to the TRS-80 and BASIC. **Additional Student Workbooks for Part 1** (26-2151, $3.50 each) are available.

Part 1: Videotape Lessons (26-2753, $349) is a series of ten 30-minute lessons based on Part 1: Introduction to BASIC. Requires the Part 1 student workbook.

Part 2: BASIC Programming (26-2152, $260) builds on the concepts introduced in Part 1. **Additional Student Workbooks for Part 2** (26-2153, $4.50 each) are available.

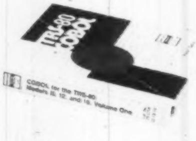
Part 3: Advanced BASIC (26-2154, $260) introduces the INKEY$ statement, ASCII character set, action graphics and more. **Additional Student Workbooks for Part 3** (26-2155, $4.50 each) are available.

Part 4: TRSDOS (26-2156, $299) covers concepts of the TRSDOS operating system. **Additional Student Workbooks for Part 4** (26-2157, $4.50 each) are available.

Introduction to TRS-80 Level II BASIC (26-2116, $9.95) is a beginning BASIC textbook for secondary students.

NOTE: Software not included in the above series. Student activities are designed for hands-on experience with Level II or Model III BASIC (or TRSDOS in Part 4).

TRS-80 COBOL Course



COBOL for Models II, 12, and 16, Vol. One (26-2706, $49.95) teaches fundamental concepts. Requires COBOL Development System (26-4703, $299) and a Model II, 12, or 16 computer. Use it as a self-teaching tool, or with **Class Notes** (26-2723, $9.95) for class instruction.

Learn Machine Language

The **Illustrated Computer** (26-2670, $44.95) introduces secondary students to machine language. The program illustrates a computer to be programmed. Requires 32K Extended BASIC Color Computer with disk drive.

Computer Literacy Packages

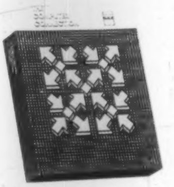
Computer Discovery™ introduces computers, their evolution and impact on society, and basic programming concepts. Each includes interactive exercises, 25 workbooks, and instructor's manual.

Computer Discovery for Junior High (26-2630, $189.95) requires a Model III or Model 4 disk system. **Additional Workbooks** (26-2631, $4.25 each) are available.

Computer Discovery for Senior High (26-2632, $189.95) requires a Model III or Model 4 disk system. **Additional Workbooks** (26-2636, $4.25 each) are available.

Careers in Computing (26-2758, $130) helps secondary students explore computer-related careers. Includes teacher's guide, 30 student manuals, narrated filmstrip, eight spirit masters and wall chart. **Additional Student Manuals** (26-2759, $1 each) available.

Computer Literacy: Computers Past and Present (26-2755, $9.95) is written for students in grades 4 through 8. Includes teacher's guide, six spirit masters and wall chart.



The **Computer Connection** (26-2663, $69) introduces basics of computer literacy to junior and senior high school students, and it's adaptable to most subject areas. Includes teacher's guide, spirit masters, four wall charts and narrated filmstrip.

Radio Shack and TRS-80 are #1 in the Classroom

Radio Shack is the leading marketer of microcomputers to schools, with more TRS-80 computers in America's schools than any other brand. And we maintain an extensive development effort to produce educational materials that use microcomputer technology in the best ways possible.

We offer educators a variety of special services. Our National Bid Department gives prompt attention to school bids. Our National Lease Department can put the TRS-80 into your classroom with terms that meet almost any budget. We offer "carry-in" and "on-site" service plans, too. And as an educator, you are eligible to attend our educator's workshop or Part 1 or Part 2 BASIC classes, without charge, at one of over 400 Radio Shack Computer Centers.

Radio Shack gives you complete support. We have 25 Regional Educational Coordinators located across the country. They can conduct demonstrations, workshops, and inservice training sessions for your school district. And our Regional Educational Coordinators can assist you in selecting the computer system and courseware that best suit your needs. For more information, visit your nearest Radio Shack Computer Center or participating store or dealer. Or call your Regional Educational Coordinator.

For the name of the full-time Regional Educational Coordinator in your area, call our Education Division at 800-433-5682, toll free. In Texas, call 800-772-8538.

Radio Shack

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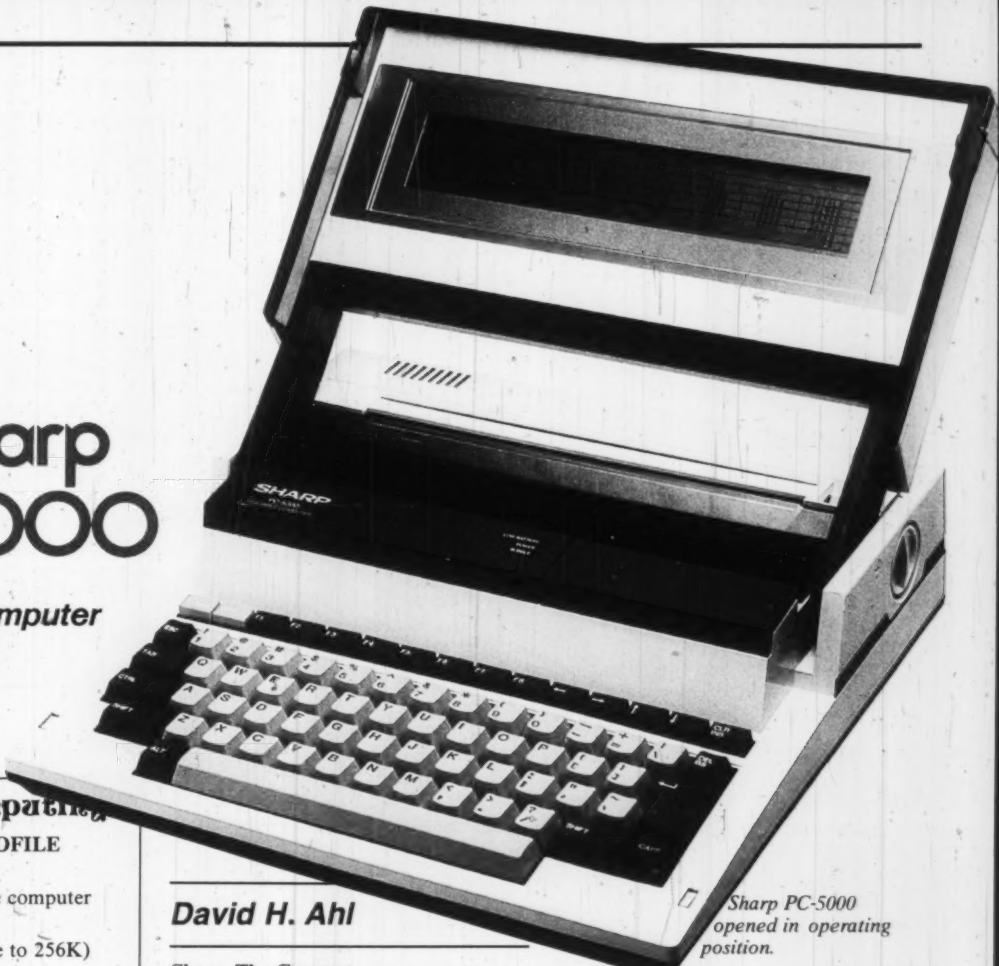
FC-0613

creative
computing
equipment
evaluation

The Sharp PC-5000

A Desktop Computer in a Portable Package



Sharp PC-5000 opened in operating position.

creative computing

HARDWARE PROFILE

- **Name:** Sharp PC-5000
- **Type:** Notebook portable computer
- **CPU:** 16-bit 8088
- **RAM:** 128K (expandable to 256K)
- **ROM:** 192K
- **Keyboard:** 57 full-stroke keys, 15 special keys
- **Display:** LCD, 8 lines x 80 characters
- **Graphics:** 80 x 640 pixels
- **Printer:** 80-col. built-in thermal
- **Ports:** Bus extender, RS-232, audio cassette, modem
- **Dimensions:** 12.8″ x 12″ x 3.4″
- **Documentation:** User's Guide, Basic manual, manual for each software package
- **Summary:** Notebook portable with removable bubble memory cartridges, 8-hour battery pack, MS-DOS and Basic; text editor and comm software included. Optional built-in printer, modem, spreadsheet, and other software packages available.
- **Price:** $1995 (printer $399, modem $349)
- **Manufacturer:**

  Sharp Electronics Corp.
  10 Sharp Plaza
  Paramus, NJ 07652

David H. Ahl

Sharp, The Company

Sharp is a giant of a company with sales of $3.8 billion in sales worldwide and nearly $800 million in the U.S. U.S. sales are divided approximately equally between consumer products and industrial products such as copiers, calculators, cash registers, facsimile equipment, electronic typewriters, and hand-held computers.

In their home country, Japan, Sharp is number 2 in computers behind industry leader NEC. Why then, is Sharp practically a non-factor in the computer market in the U.S.? Two reasons. First, their current channels of distribution are primarily NOMDA (office products) dealers which, for the most part, have been less-than-successful in marketing computers. Second, Sharp's first computer entry some two years ago did not have the software that buyers were demanding.

Sharp thinks that the PC-5000 is the product that will turn all that around. We think they are right. It is significantly different from other products, and computer stores should jump over themselves to handle it. Sharp has a goal of availability in 800 computer stores by the end of 1984; we think that goal is modest, and that far more stores than that will want to handle the PC-5000.

Furthermore, Sharp is not planning any distribution through mass merchandisers. This will help to avoid the price wars now creating havoc in the low end of the market.

The software that Sharp has chosen to

Buttoned up, the PC-5000 measures about 12″ square.

implement on the PC-5000 should answer the needs of most business and professional users. Furthermore, they currently have a wide array of peripherals and are committed to being competitive in that area.

So, from the standpoint of corporate strategy, Sharp seems to be on the road to success with the PC-5000. Moreover, they have the financial clout to stay in the market even if the going gets rough. But what of the product itself?

On The Outside

At first glance, one might be tempted to say that the PC-5000 is just the next step in the evolution of notebook computers that started with the Epson HX-20 (screen; 4 lines by 20 characters, mini printer). Next came the Tandy Model 100 and NEC 8201 twins (screen: 8 lines by 40 characters, no printer but built-in modem). Then the Sharp PC-5000 (screen: 8 lines by 80 characters, 80-column printer, and integral modem).

But that is a vast oversimplification; the PC-5000 is far more. Indeed it is far closer in capability to a desktop computer than it is to a notebook machine. In many ways, it is more like an IBM PC than a TRS-80 Model 100. But like the Model 100, it is a battery-powered portable, and that is where we will start our evaluation.

Folded up, the PC-5000 measures 12.8" x 12" x 3.4" and weighs 11.02 pounds. That is about one third the weight of a Kaypro-type portable and three times that of a Model 100. Although 11 pounds sounds light, it is heavy enough to discourage you from carrying it everywhere.

Fitted into the top of the case is a direct-connect modem/telephone handset with several nifty features. It measures just 8" x 4" x 0.8". More about the modem later.

Not included in the dimensions or weight of the basic unit is the AC power supply/charger. This is a hefty 12 volt, 850 ma. supply which measures 3" x 4" x 2.2" and weighs a bit over one pound.

The computer, power supply, bubble memory cartridges, printer ribbon and paper, modem cables, and manuals fit nicely in a standard attaché case with room left over for additional papers or books. Sharp is working with American Tourister to offer a version of their standard 6" case with fitted cutouts for a complete PC-5000 system.

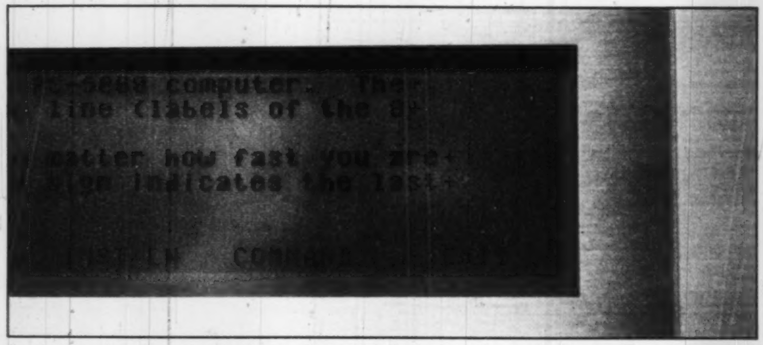
Review set-up. We took notes on paper and a Model 100 about various aspects of the Sharp.

PC-5000 and power supply in fitted attache case.

The front portion of the PC-5000 case pivots up and contains an LCD screen of eight lines by 80 characters. The active portion of the display measures 1.3" x 9.3". This is smaller than the Model 100 display (2" x 7.5"); thus to fit eight lines of 80 characters each requires a mighty small character size.

The graphics resolution of the screen is 80 x 640 pixels, each one of which is individually addressable from Basic using the PSET (on) and PRESET (off) commands.

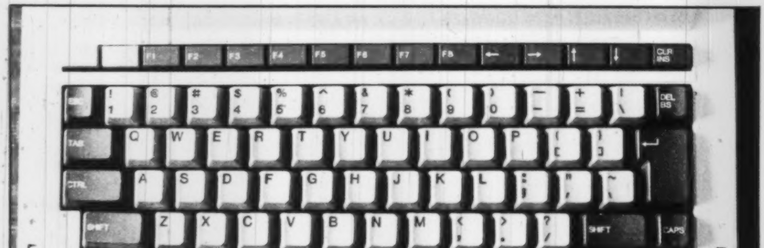
Characters are formed within a 5 x 7 dot matrix, with two dots allocated for letter descenders and one dot for interlinear spacing. That means that each character is 0.15" high, the same as a dot matrix printer set to print six lines per inch. As we said, this is mighty small. This diminutive size coupled with the usual black-on-gray LCD display means that it is critical to adjust the angle of the display and the contrast of the LCD elements correctly (a thumbwheel is provided on the side of the case for this).



```
PC-5000 computer.  Ther
 line (labels of the 8+

matter how fast you are+
sign indicates the last+
```

In the word processing package, plus signs designate the end of rows. Text is in a bold display face while the bottom line of functions is in the "normal" display face. Photo is actual size.


F1 F2 F3 F4 F5 F6 F7 F8 ← → ↑ ↓ CLR INS
ESC ! 1 @ 2 # 3 $ 4 % 5 ^ 6 & 7 * 8 (9) 0 — - + = | \ DEL BS
TAB Q W E R T Y U I O P { [}]
CTRL A S D F G H J K L : ; " ' ~
SHIFT Z X C V B N M < , > . ? / SHIFT CAPS
ALT

Keyboard has 57 full-stroke keys arranged in a standard pattern, and 15 special keys in a line above.

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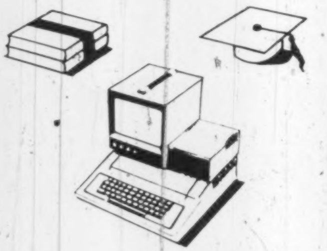
YOUR CHILDREN'S FUTURE



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CIRCLE 279 ON READER SERVICE CARD

Sharp PC-5000, continued...

The PC-5000 is turned on with a rocker power switch at the rear. This calls up MS-DOS which allows you to choose one of the internal programs in ROM (for now, only Basic) or a program from any one of the devices accessible from MS-DOS. Input devices that can be accessed are bubble memory cartridges A and B, disk drives C and D, and a cassette recorder. Later, Sharp promises ROM availability of *Easy-Writer* and some of the other Easy packages from BSG Software.

The PC-5000 keyboard is almost 100% standard with no unexpected keys to confuse a touch typist.

Bubble memory cartridges (128K each!) measuring just 2" x 2" x 0.3" are inserted in a slot at the top of the keyboard beneath a hinged cover. To the left of the cover are three small LEDs. A yellow one indicates that power is on, a red one warns that the battery is getting low and needs a charge, and a green one indicates that the bubble memory is being accessed (just like a disk drive indicator).

Standard Keyboard

Unlike so many other computers which have all kinds of extra keys in unexpected places, the PC-5000 keyboard is almost 100% standard with no unexpected keys to confuse a touch typist. SHIFT and TAB keys are double size where they belong, and the RETURN key is double height and width—again, where it belongs.

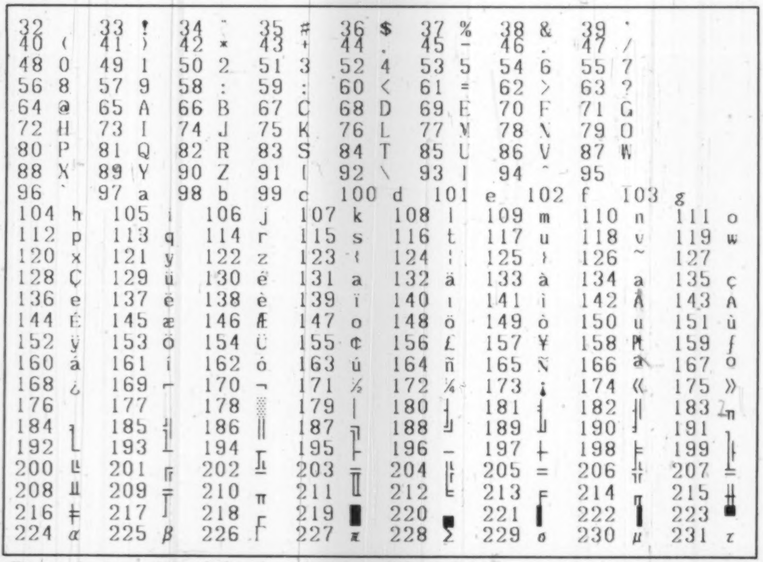
The only exception to the standard layout is the CAPS LOCK key which is to the right of the rightmost SHIFT key. As expected, it toggles caps lock on and off but it does not stay down when it is on. Thus, you must look at the screen to determine whether caps lock is on or not—a curious oversight in an otherwise excellent keyboard.

The alphanumeric keys are light gray with black markings, and the control keys are dark gray with white markings. The keytops are all matte finished and concave sculpted, a nice touch.

There is a slight "give" to the keyboard in the center, typical of keyboards mounted on a PC board supported only at the sides. It is not a major problem, but we think Sharp should consider putting in some additional supports, assuming they do not interfere with the circuitry beneath the keyboard. But as we said, it is not a serious drawback, and, in its current design, the keyboard has a better feel than the Model 100.

Above the alphanumeric portion of the keyboard is a row of 15 rectangular keys. The two at the left are orange and are marked ON/BRK and OFF. The OFF key temporarily puts the computer to sleep to await incoming modem traffic or program input, while the ON key awakens it. It also acts as a Break in Basic programs.

The next eight keys are function keys.



```
32       33 !     34 "     35 #     36 $     37 %     38 &     39 '
40 (     41 )     42 *     43 +     44 ,     45 -     46 .     47 /
48 0     49 1     50 2     51 3     52 4     53 5     54 6     55 7
56 8     57 9     58 :     59 ;     60 <     61 =     62 >     63 ?
64 @     65 A     66 B     67 C     68 D     69 E     70 F     71 G
72 H     73 I     74 J     75 K     76 L     77 M     78 N     79 O
80 P     81 Q     82 R     83 S     84 T     85 U     86 V     87 W
88 X     89 Y     90 Z     91 [     92 \     93 ]     94 ^     95
96 `     97 a     98 b     99 c     100 d    101 e    102 f    103 g
104 h    105 i    106 j    107 k    108 l    109 m    110 n    111 o
112 p    113 q    114 r    115 s    116 t    117 u    118 v    119 w
120 x    121 y    122 z    123 {    124 |    125 }    126 ~    127
128 Ç    129 ü    130 é    131 a    132 ä    133 à    134 a    135 ç
136 e    137 ë    138 è    139 ï    140 ı    141 ì    142 Ä    143 A
144 É    145 æ    146 Æ    147 o    148 ö    149 ò    150 u    151 ù
152 ÿ    153 Ö    154 Ü    155 ¢    156 £    157 ¥    158 ₧    159 ƒ
160 á    161 í    162 ó    163 ú    164 ñ    165 Ñ    166 ª    167 º
168 ¿    169 ⌐    170 ¬    171 ½    172 ¼    173 ¡    174 «    175 »
176      177      178 ▓    179 │    180 ┤    181 ╡    182 ╢    183 ╖
184 ╕    185 ╣    186 ║    187 ╗    188 ╝    189 ╜    190 ╛    191 ┐
192 └    193 ┴    194 ┬    195 ├    196 ─    197 ┼    198 ╞    199 ╟
200 ╚    201 ╔    202 ╩    203 ╦    204 ╠    205 ═    206 ╬    207 ╧
208 ╨    209 ╤    210 ╥    211 ╙    212 ╘    213 ╒    214 ╓    215 ╫
216 ╪    217 ┘    218 ┌    219 █    220 ▄    221 ▌    222 ▐    223 ▀
224 α    225 β    226 Γ    227 π    228 Σ    229 σ    230 µ    231 τ
```

Figure 1. A portion of the character set of the PC-5000 as printed by the internal printer on thermal paper.

"I TRIED TO GIVE UP SMOKING BY EATING PRUNES. THEN I GAVE UP PRUNES."

These are days when more and more people decide that smoking really isn't healthy. Then, they decide to give it up.

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If you've decided to stop smoking and don't care for prunes, you should investigate **EXPANDO-VISION** now.

ASK FOR A FREE BROCHURE. Call toll free 1-800-543-7500 (operator 828), or charge your purchase to VISA,® MasterCard,™ American Express® or Diner's Club.® To pay by check or money order, write: Stimutech, Inc., P.O. Box 2575, Dept. 308 B, East Lansing, Michigan 48823. (Mich. residents add 4% sales tax.) Add $3.00 shipping/handling. Allow 4-6 weeks delivery.

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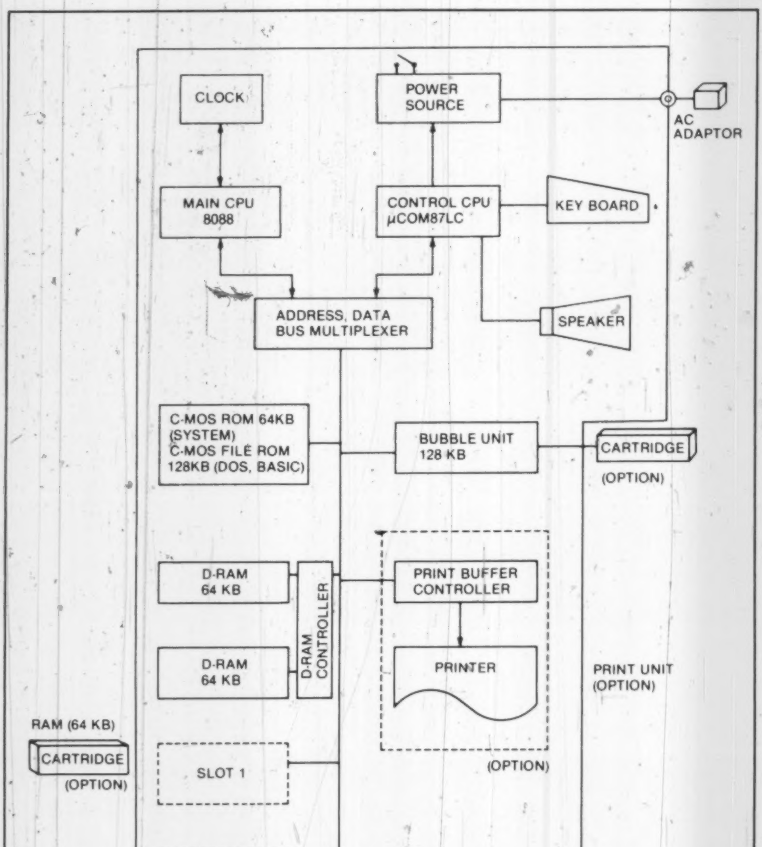
CIRCLE 215 ON READER SERVICE CARD

These have different meanings in various software packages or can be user-set from either Basic or MS-DOS.

Continuing to the right, the next four keys are cursor control keys. Why did Sharp not lay them out in a logical diamond pattern as on the NEC 8201, but choose instead a straight line? We'll probably never know, but in our minds this is not at all user-friendly. To make matters worse, there is no space between the left arrow key and function key 8. Why is this bad? Because function key 8 is normally the one used to exit a program, and it is all too easy to hit it when you intend to hit the left cursor key—the one used most frequently. More than once we exited the word processing package inadvertently and turned TRACE on in Basic (function key 8) when intending to hit the left arrow.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CONTROL CPU μCOM87LC
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SPEAKER
C-MOS ROM 64KB (SYSTEM) C-MOS FILE ROM 128KB (DOS, BASIC)
BUBBLE UNIT 128 KB
CARTRIDGE
(OPTION)
D-RAM 64 KB
D-RAM 64 KB
D-RAM CONTROLLER
PRINT BUFFER CONTROLLER
PRINTER
PRINT UNIT (OPTION)
(OPTION)
RAM (64 KB)
CARTRIDGE
(OPTION)
SLOT 1
SLOT 2
LCD
LCD INTERFACE DRIVER
AUDIO CASSETTE DRIVER
EXTERNAL BUS DRIVER
PERIPHERAL CONTROLLER-B
PERIPHERAL CONTROLLER-A
RS-232C DRIVER
AUDIO CASSETTE (OPTION)
MODEM
(OPTION)
MINI-FLOPPY (OPTION)

Figure 2. System block diagram of the PC-5000.

The last key in the top row is an orange CLEAR/INSERT key. In both Basic and *SuperWriter*, insert is toggled on and off with this key. In Basic, when insert is on, the cursor (normally a one-dot underline) changes to a two-dot underline. It is canceled by hitting the INSERT key a second time, any one of the cursor keys, or the RETURN key. However, in *SuperWriter*, there is no indication on the screen that insert mode is on, and it can be canceled only by hitting the INSERT key a second time. We found this inconsistency somewhat disconcerting, and feel that the software packages ought to be consistent.

An ALT MODE key is at the left of the spacebar. It toggles the keyboard into an alternative mode which, in Basic, causes most of the keys to produce a Basic keyword such as GOTO, RESTORE, and PRINT. The various graphics symbols and foreign letters can be produced directly from the keyboard by holding down the SHIFT and toggling on the CAPS LOCK. This is less convenient than a single graphics key, but at least it provides keyboard access to characters above ASCII 128 (see Figure 1).

On The Inside

The PC-5000 is built around a 16-bit 8088 mpu. It has a whopping 192K of CMOS ROM memory, 64K for the operating system, and 128K for DOS and Basic. The basic machine is equipped with 128K of RAM; an additional 128K is available. As mentioned earlier, it has a slot into which a bubble memory cartridge (128K of non-volatile memory) can be installed. A very thoughtful feature is the warning that appears on the screen when the bubble memory is 97% full.

Also on the main bus are a real-time clock, external bus driver (for floppy disks or other external devices), audio cassette interface (1600 bps), RS-232 interface, modem interface (300 baud), as well as an address and data bus multiplexer. This latter item directs data to and from either the main 8088 mpu (actually very little goes to it) and the CMOS controller. This is an important

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Inside Apple

Vol. 1, No. 4

A dot matrix printer that will improve your image.

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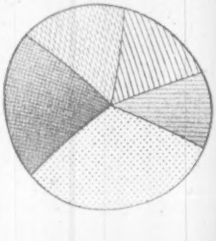
And is it fast.

The Imagewriter cruises at an unbelievable 120 characters per second. And that's just in the text mode. It's even faster printing graphics. 180 characters per second, to be exact.

What's more, the graphics dump is up to 60% faster than other comparably priced dot matrix printers. And that makes the Imagewriter fast enough to handle the Lisa.™

Yet it's just as at home with an Apple III or Apple IIe. Thanks to Apple software experts who designed the control electronics to give the Imagewriter perfect compatibility. Not to mention some special capabilities like superscript and subscript, to name just two.



Now, with all this high-speed performance, you'd expect the Imagewriter to make the Devil's Own Noise. It doesn't. In fact, the Imagewriter is specially constructed — with overlaid seams and special sound-deadening materials — to achieve a remarkable 53 dB. How loud is a remarkable 53 dB? You'd make more noise if you read this aloud.

The Imagewriter even has quiet good looks, since we designed it to look like the rest of the Apple Family.

Yet even with all its improvements, the Imagewriter is a better deal than any other dot matrix printer with comparable performance. And you can print that.

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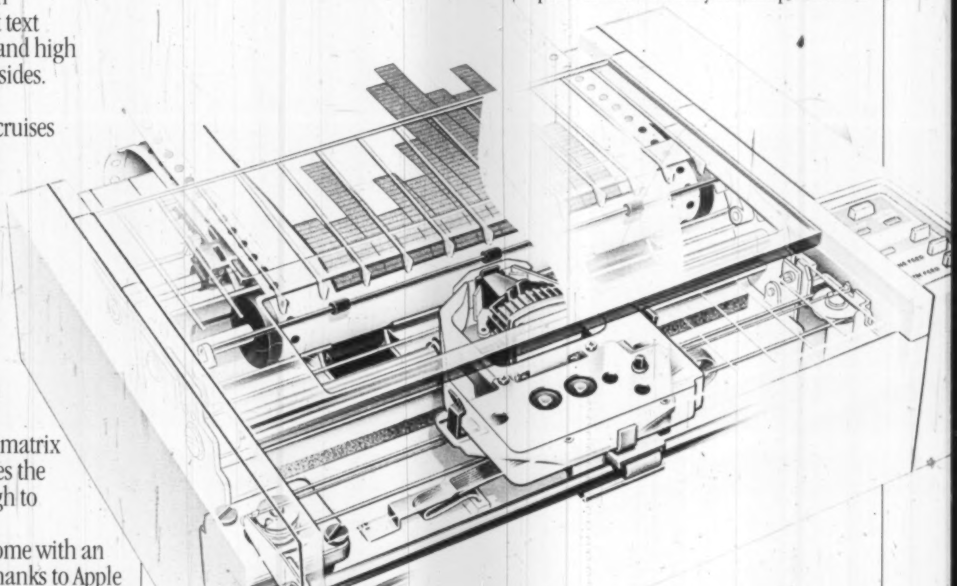

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You can then take your Apple system home. You don't even have to wait for the Card; we'll mail it out to you. And by the time you get it, you'll probably be well into doing whatever you bought your Apple system to do.

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Give your floppy disks the boot.

We call it the "floppy disk shuffle." It happens when you have two or more software programs on floppies and you need to work with both. What do you do? You put one disk in, boot it, do your work, take it out, put the other disk in, boot it, do your work — you get the idea.

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Thanks to a unique new software program called Catalyst™ from Quark, Inc. Specially designed for your Apple III and ProFile™ hard disk.

Catalyst allows you to take a wide variety of software programs and store them on your ProFile. Once they're on your ProFile, you just select the program you want from the Catalyst menu that appears on your monitor — then Catalyst does the rest. You'll never have to boot those programs again.

What kinds of programs will work with ProFile and Catalyst? Almost anything written for the Apple III including copy-protected programs like VisiCalc,® Quick File™ and Apple Writer III. Or languages like Pascal, BASIC, or COBOL.

And once you've loaded these programs into your ProFile, the only diskette you may ever need is the Catalyst.

So if you have an Apple III and a ProFile and more floppies than you care to flip through, get yourself a Catalyst. And boot those disks for good.

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function since the 8088 requires more power and runs hotter than the CMOS circuitry, so it is desirable to use the 8088 only for essential functions. (See Figure 2.)

Also on the inside are the printer controller, LCD display controller, and keyboard interface.

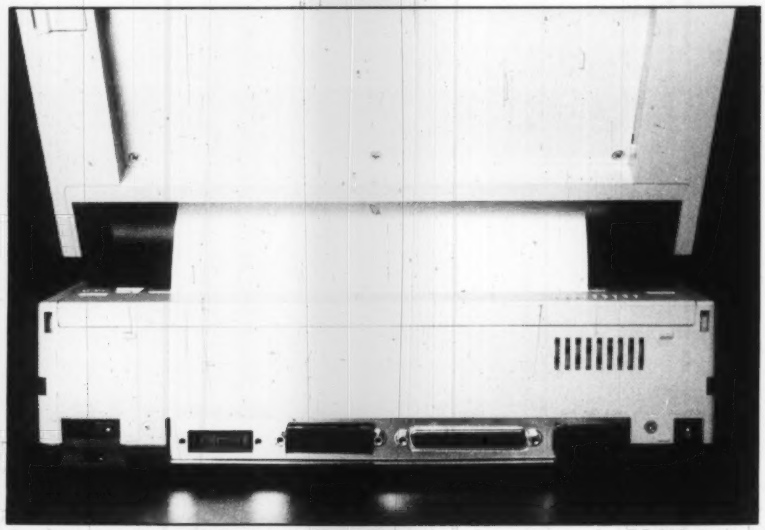
Connectors are provided on the back of the PC-5000 for cassette cables, external bus, RS-232, modem, and AC power supply.

The PC-5000 can operate on either an AC power supply (which doubles as a charger) or an internal lead acid battery. Acid, acid? Why not NiCad like everyone else uses? Several reasons. First, an acid battery has a much longer shelf life than a NiCad. Second, it is smaller and lighter for the same power output. And third, it charges faster.

The battery provides eight hours of continuous run time—slightly longer if the machine is used intermittently. A full recharge takes about four hours. As mentioned, a red LED indicates when the battery is getting low. For the user on the move, an extra battery is probably a smart buy.

Bubble Memory Or Floppy Disk?

The PC-5000 has two types of external memory available, bubble memory and floppy disk. Obviously, in the portable mode of operation, bubble memory is the only choice. Each 2" square cartridge holds 128K, and preprogrammed bubble cartridges can contain applications programs or different versions of the operating system.



On the back of the PC-5000 is the on/off switch and connectors for RS-232 devices, serial I/O, external bus, cassette recorder, and AC adapter.

To the operating system, the bubble cartridge looks just like a double-density single-sided disk drive. MS-DOS recognizes the bubble cartridges as device A and B. Data is stored 512 bytes per sec-

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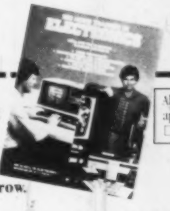

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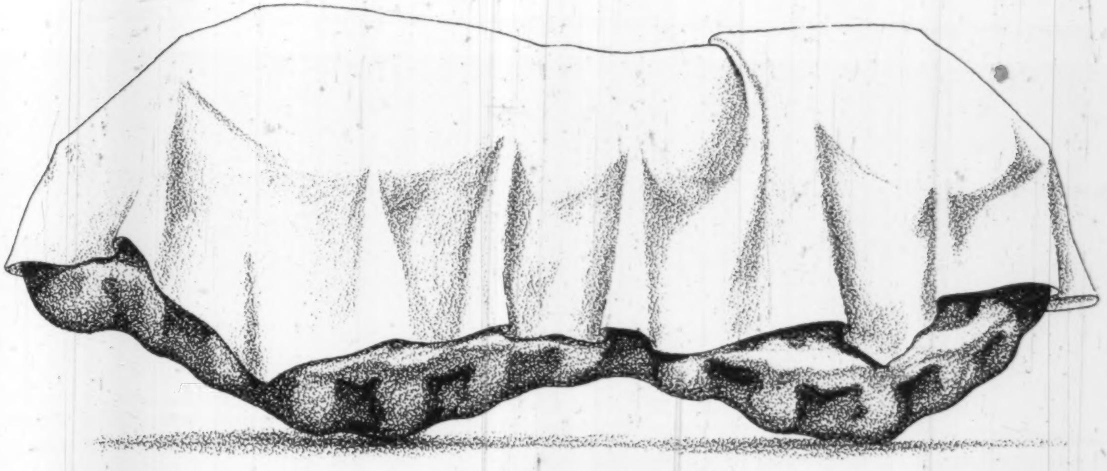

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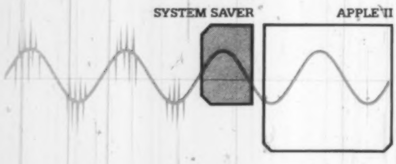
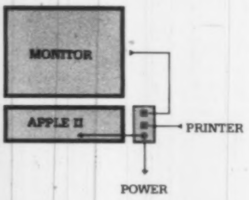
System Saver filters out damaging AC line noise and power surges.
70-90% of all microcomputer malfunctions can be traced to power line problems.** Problems your System Saver guards against.

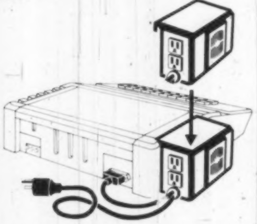
Power line noise can often be interpreted as data. This confuses your computer and produces system errors. Power surges and spikes can cause severe damage to your Apple's delicate circuitry and lead to costly servicing.

System Saver clips surges and spikes at a 130 Volts RMS/175 Volts dc level. A PI type filter attenuates common and transverse mode noise by a minimum of 30 dB from 600 kHz to 20 mHz with a maximum attenuation of 50 dB. You end up with an Apple that's more accurate, more efficient and more reliable.



System Saver makes your Apple more convenient to use.
No more reaching around to the back of your Apple to turn it on. No more fumbling for outlets and cords to plug in your monitor and printer. System Saver organizes all your power needs.

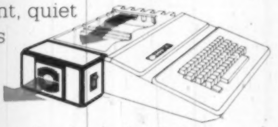


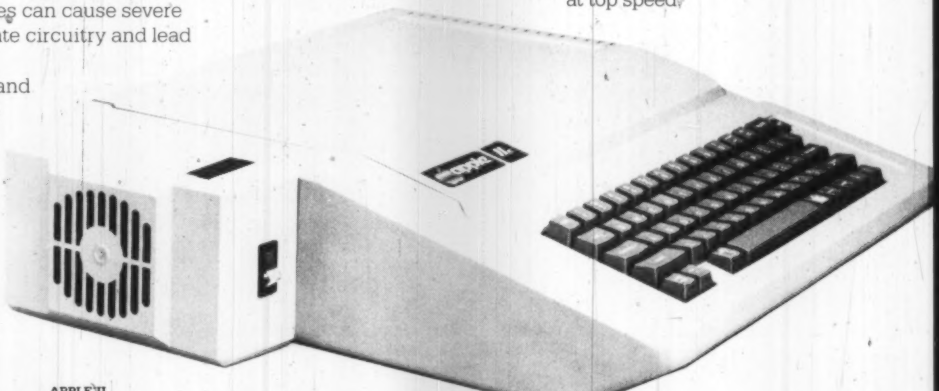


It functions as a multi-outlet power strip with two switched outlets. Plus System Saver offers the ultimate convenience; a front mounted power switch for fingertip control of your entire system.

System Saver lets your Apple keep its cool.
Today's advanced peripheral cards generate heat. In addition, the cards block any natural air flow through the Apple IIe creating high temperature conditions that shorten the life of the Apple and peripheral cards.

System Saver's efficient, quiet fan draws fresh air across the mother board, over the power supply and out the side ventilation slots. It leaves your Apple cool, calm and running at top speed.





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*Softsel Computer Products Hot List **PC Magazine March 1983

System Saver is UL Listed. System Saver's surge suppression circuitry conforms to IEEE specification 507 1980. Category A. Available in 220/240 Volts, 50/60 Hz.

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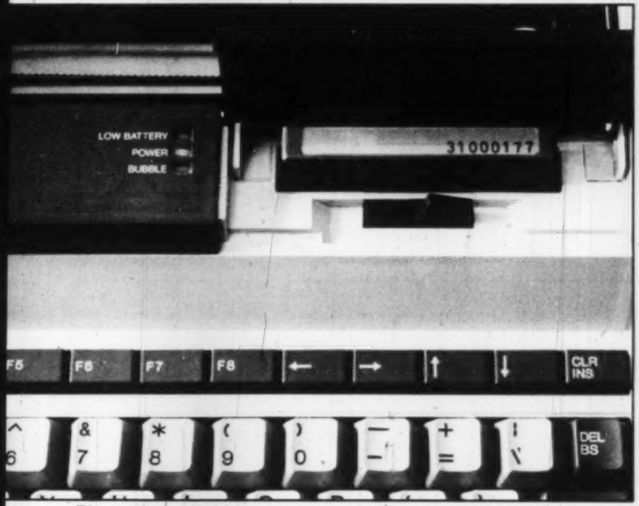

Photo shows bubble memory cartridge compartment with cover open, three LED indicators, and poor horizontal arrangement of cursor control keys.

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CE-100B
MAGNETIC BUBBLE MEMORY
TITLE
SHARP CORPORATION
MADE IN JAPAN / FABRIQUE AU JAPON

Bubble memory cartridge is just over 2" square.

tor, eight sectors per track. Bubble cartridges are formatted as delivered.

Also like a floppy disk, bubble cartridges can be write protected by placing a silver sticker on the right side of the cartridge. Like floppy disks, bubble cartridges should be treated carefully and kept away from strong magnetic fields. Like a disk, it is sensitive to temperature, and the bubble cartridge has a built-in temperature lock that prevents operation below 32° or above 104°.

The disk drive available for the PC-5000 is the CE-510F, a double-density, double-sided 5¼" unit with a capacity of 320K per disk. The drive, of course, must be operated wih AC power and is not portable.

Built-in Printer

The printer built into the PC-5000 is a thermal unit which uses individual sheets of either thermal paper or plain bond. It is simple to install the printer in the event it is not purchased with the basic unit. One cable connector, four screws, and a platen feed knob do it.

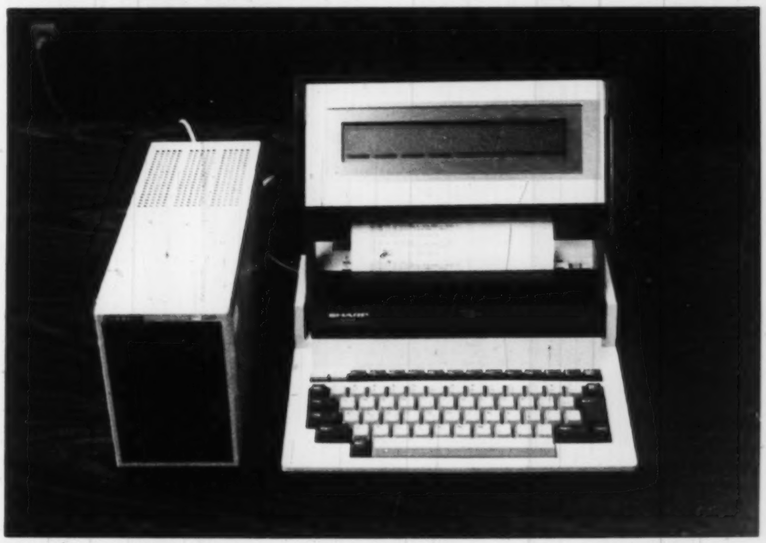
In the thermal mode of operation, you simply put a piece of thermal paper in the printer from the rear, turn the knob a few turns, and that's it. Paper loading was considerably simpler than with the thermal unit on the Computer Devices DOT machine. An automatic paper sensor halts printing when there is less than 1" of paper remaining.

There is a contrast selector on the printhead which can be used to adjust for the best output.

The printer can be set for either 10 or 12 characters per inch. At 10 cpi, print speed is 30 cps, and at 12 cpi, the speed is 37 cps. Thus a single spaced page takes approximately two minutes to print, not a speed demon, but no slouch either. Moreover, the thermal mechanism is whisper quiet. Four of us carried on a normal conversation around a table with the printer churning away in the center, something you couldn't do with a dot matrix unit.

Like floppy disks, bubble cartridges should be treated carefully and kept away from strong magnetic fields.

To print on plain paper, a one-time thermal ribbon cartridge is inserted in the printer. In this mode of operation, the printed image is burned into the ribbon and transferred to the paper. It does not smudge at all and is similar to a good Xerox copy. As with a photocopier, rag bond or textured paper cannot be used; a smooth-finish copier paper gives the best results.

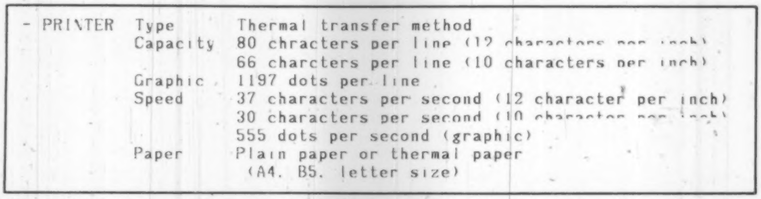


The PC-5000 with optional 5 1/4" floppy disk drive.

Sharp PC-5000, continued...

Although plain paper printing sounds wonderful, we think that thermal paper may be a better choice. Plain paper printing requires a one-time ribbon cartridge ($5.99). Moreover, the ribbon tension must be carefully adjusted; Figure 3 shows the result of it being slightly loose. Nevertheless, it is nice to have the capability for the few things that must be on plain paper.

The printer can print standard characters at 10 and 12 cpi as well as dot graphics in the same density as the display (640 dots per 6.67" line). See Figure 4.



```
- PRINTER  Type       Thermal transfer method
           Capacity   80 chracters per line (12 characters per inch)
                      66 charcters per line (10 characters per inch)
           Graphic    1197 dots per line
           Speed      37 characters per second (12 character per inch)
                      30 characters per second (10 character per inch)
                      555 dots per second (graphic)
           Paper      Plain paper or thermal paper
                       (A4. B5. letter size)
```

Figure 3. Print sample on plain paper shows partial type at the ends of some lines, the result of the tension of the printer ribbon not being adjusted correctly. With the correct tension, print quality is excellent.

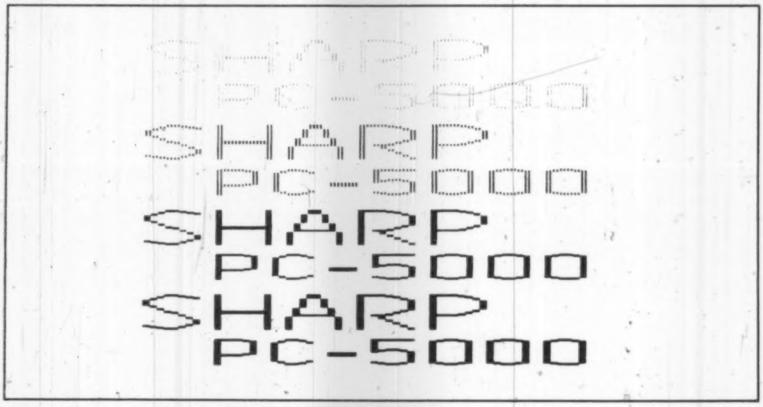


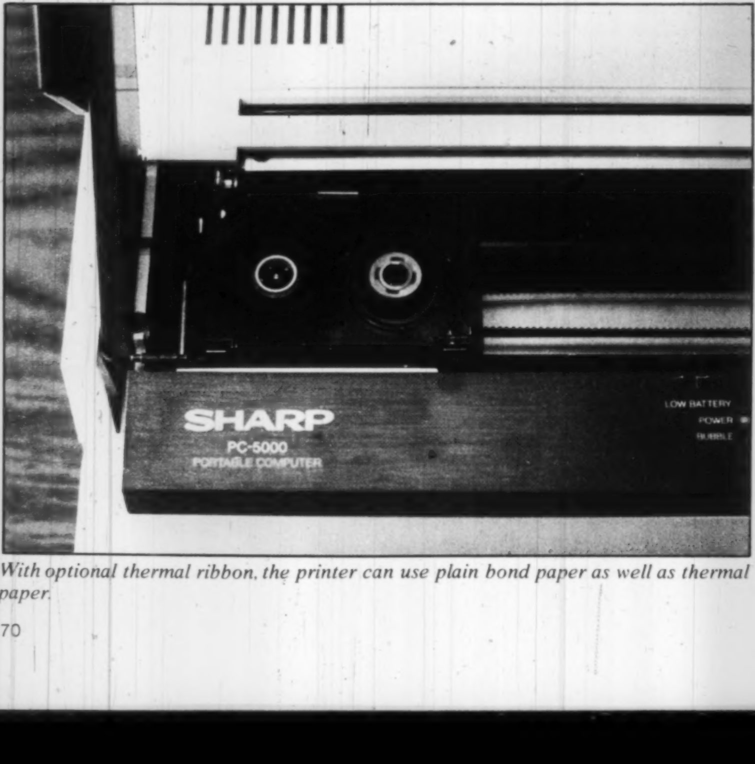
Figure 4. Printer is capable of producing dot graphics. This sample was done on plain paper.

Operating System

The standard operating system in the ROM of the PC-5000 is Microsoft MS-DOS. The system must be started with either a bubble memory cartridge or a disk drive installed. Whichever is installed becomes the system unit. If both are connected, pressing A or B selects the bubble memory and C or D selects a disk drive.

Upon a correct power up or warm start, the standard MS-DOS v. 2.02 dialog is displayed along with the current date. MS-DOS then looks for an auto-execute file which, if found, is executed. This is useful if you plan to use the machine mostly for word processing, spreadsheet calculations, or some other function. If there is no auto-execute file, MS-DOS displays the standard A> or C> prompt. You may then call up any utility, applications program, or other file.

MS-DOS has the expected utilities (copy, format, directory, delete, rename, etc.). Specific to the PC-5000 are commands to stop and resume scrolling on the display, turn on printer echo (to turn your PC-5000 into an expensive typewriter), set printer cpi, set the communications parameters, and put the machine to sleep.



With optional thermal ribbon, the printer can use plain bond paper as well as thermal paper.

GW Basic

As available on other 8088-based computers, the PC-5000 has Microsoft GW (Gee Whiz) Basic available. We have reviewed this before and will not go into the many extended features of this outstanding Basic.

Variables in GW Basic can be integer, single or double precision, or string. Default mode is single precision. In our benchmark, accuracy and randomness were the same as the TI Professional and Computer Devices DOT, and better than the IBM PC. Speed was excellent also. See Table 1 for some interesting comparisons.

GW Basic has six Boolean operators including XOR, EQV, and IMP. For program chaining, it has COMMON, CHAIN, and MERGE. For random-access data

Computer	Time	Accuracy (Smaller is better)
TI Professional	0:15	.005859375
Sharp PC-5000	0:18	.005859375
Computer Devices DOT	0:22	.005859375
IBM PC	0:24	.01159668
NEC PC-8201	1:44	.187805
Tandy Model 100	4:54	.0000002058

Table 1. Speed and accuracy of selected 16-bit and portable computers.

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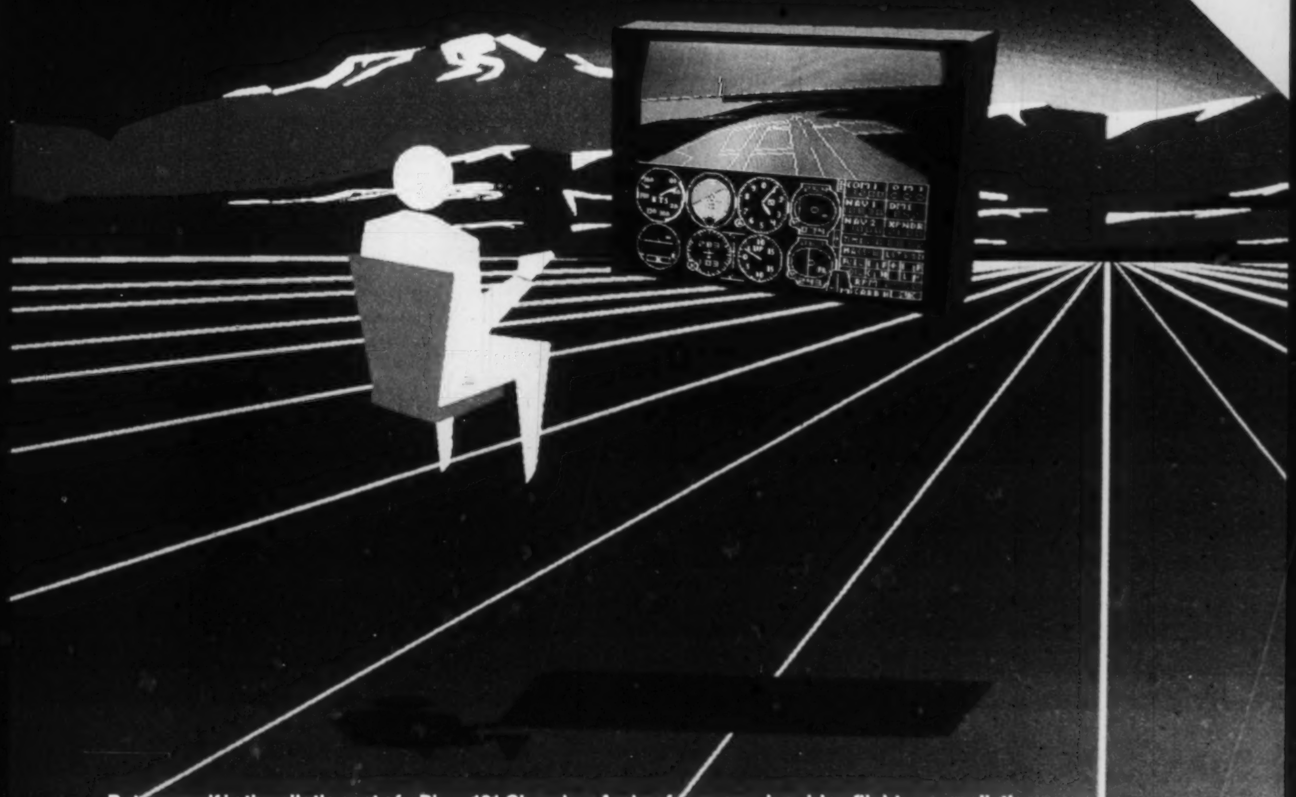

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files, it has FIELD, GET, PUT, LSET, and RSET. USR calls machine language routines, but there is no documentation on writing machine language code. ON KEY tests to see if a function key has been pressed, and ON COMM activates a communications trap routine.

An interesting statement we hadn't seen before is OPTION BASE which sets the first value in dimensioned arrays to either 0 or 1. Arrays, incidentally, can have up to three dimensions.

The graphics capabilities are extensive and include PSET, RESET, and LOCATE (cursor positioning). CIRCLE automatically draws circles, ellipses, and arcs on the LCD screen.

The WAIT command halts program execution until a specific bit appears at a port you specify. The manual admonishes caution when using this command: "Be careful! You could wait forever if the bit you want doesn't appear."

> **Limited sound capability is available with the tiny built-in speaker.**

Limited sound capability is available with the tiny built-in speaker. BEEP provides a single tone while SOUND provides a tone of any duration with a frequency between 37 and 32767 Hz.

Word Processing

The standard word processing package supplied with the PC-5000 is *SuperWriter* from Sorcim Software. We have not evaluated *SuperWriter* in *Creative Computing* and were unable to convince Sorcim to send us a manual, so these remarks are based on a few hours of use on the PC-5000 *sans* manual.

SuperWriter appears to be quite user-friendly and inadvertently pressing the exit key several times did not result in the loss or destruction of anything vital (like our text).

The package is completely menu driven, and does not seem to burden the user with extraneous or inexplicable commands. The screen wraps automatically and, no matter how fast you type, does not drop characters (like some other word processors we know). A plus sign indicates the last character on a screen line, a nice feature for keeping track of imbedded spaces.

Curiously, the display does not scroll. Instead, when seven lines have been typed, the text jumps up five lines leaving the previous bottom two lines as the top two lines on the new screen.

One not-so-friendly feature is that the cursor disappears if it is held down. What is acutally happening is that the cursor is moving in the direction specified, only to reappear when you release the key. Reappear where? Well, as far as it has traveled while the key was depressed which might be three characters away or 30 characters or 100 characters. We quickly abandoned the cursor repeat feature in favor of individual keystrokes to move the cursor exactly where we wanted it.

An insert mode is available but, as mentioned earlier, the cursor does not change size or shape, so you have no idea whether you are in insert mode except by looking at what you are typing.

Nevertheless, despite these minor shortcomings, we judge *SuperWriter* to be a good, solid word processor, and one that is well-suited to the PC-5000.

Sharp tells us that before too long, *EasyWriter* from BSG Software will also be available in ROM for the PC-5000, thus giving the user a choice between two excellent packages.

Applications Software

Two other packages from Sorcim are also available on a separate bubble memory cartridge, *SuperCalc-2* and *SuperPlanner.* Thus for users with the need of a spreadsheet, at least one is available immediately.

In addition, Sharp informs us that 17 other software houses are currently working to convert one or more packages to run on the PC-5000. Given the host environment of MS-DOS and a screen width of 80 characters, it shouldn't be too long before many of these packages are available.

Communications

Communications on the PC-5000 is accomplished using the CE-510T modem/dialer. This is a 300 baud direct-connect unit with a built-in dialer, speaker, and microphone. The modem stores up to ten 16-digit telephone numbers which can be dialed automatically by pressing one button. Of course, numbers may also be dialed manually. In case of a missed connection or busy signal, a recall button is also available.

Unlike other modems, the CE-510T has a speaker and microphone built in; thus it can be used as a standard handset or, when placed flat on a table, as a conference phone.

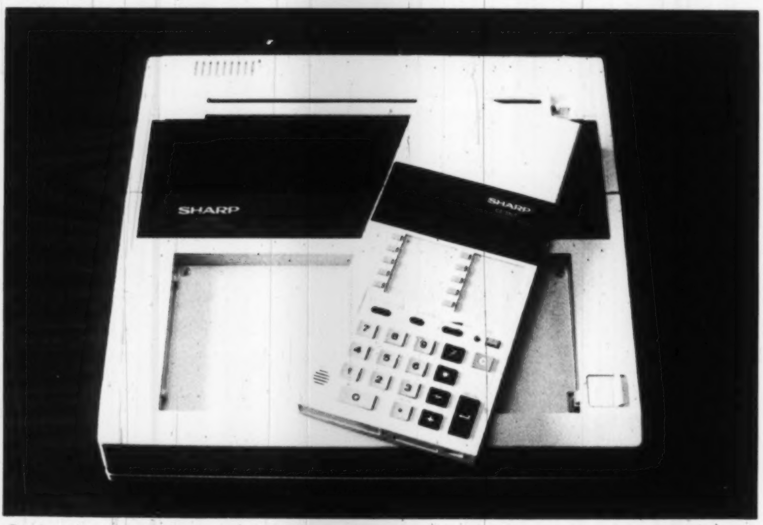
To use the computer in a communications mode, a communications software package, *SuperComm* by Sorcim, is provided with the basic unit. The modem, however, is not included with the computer; it is an extra cost ($349) item.

Documentation

Documentation with the PC-5000 consists of a User's Guide, Basic manual, and manuals for *SuperWriter* and *SuperComm.*

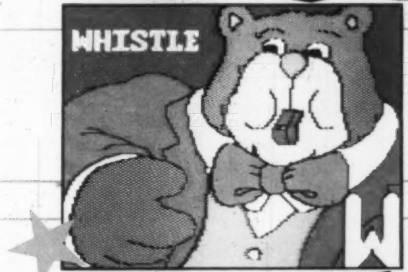
We had preliminary documentation with our evaluation unit so we can comment only on the content of the manuals and not their final appearance or size.

The User's Guide has seven chapters and seven appendices. The chapters cover the components of the PC-5000, setting up, installing the options, starting up, installing and using the printer, and a very long chapter (more than 60% of the manual) on MS-DOS. The manual is comprehensive, clear, and well-illustrated with scores of photos and diagrams.

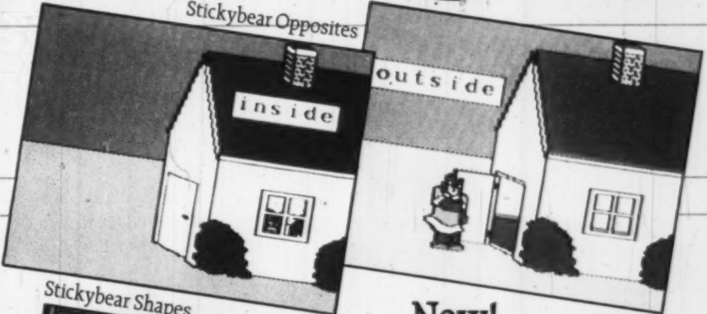


Optional modem fits into the lid of the case. It doubles as a portable conference telephone.

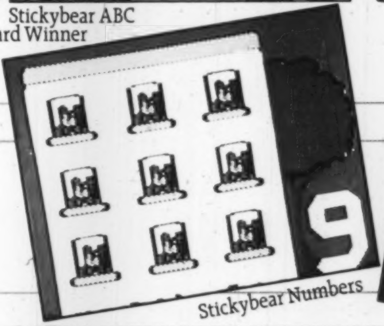
The Bear essentials.



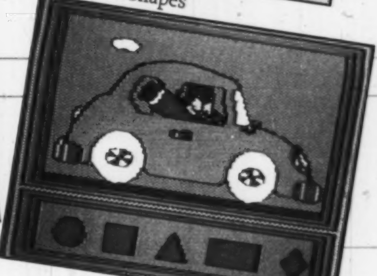
Stickybear ABC
Award Winner



Stickybear Opposites



Stickybear Numbers



Stickybear Shapes

New!

Stickybear Shapes
Three games – Name a Shape, Pick a Shape, Find a Shape. Correct answers make animated pictures come alive.

Stickybear Opposites
Big, colorful animated pictures – Stickybears, unicycles, balloons, more – teach opposites. Up/down, full/empty, in front/behind, more.

Stickybear ABC Award-Winner
Full-screen, full-color animated pictures represent each letter in the alphabet.

Stickybear Numbers
Colorful moving objects – trucks, ducks, planes, more – teach numbers and counting. Over 250 picture combinations.

Runs on Apple II or Apple II + with 48K and one disk drive, 3.3 DOS; and Apple IIe or Apple III.

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Created by Richard Hefter, Janie and Steve Worthington and Spencer Howe for Optimum Resource, Inc.

A/M28-L2

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Sharp PC-5000, continued...

The Basic manual is the usual Microsoft GW Basic manual customized for the PC-5000. It has six chapters covering editing, structured programming (aw, come on now), statements, commands, and functions. As we've said before, this is not a substitute for a good Basic programming text, but mainly is a reference guide to the particular implementation.

Service

Service, if needed for the PC-5000, is available from most (but not all) selling dealers. More interesting is a program called EXTRA (Extended Time Replacement Agreement) available to either the dealer or end user. This provides three options: (1) mail or carry in to one of the five Sharp regional service centers for repair, (2) Over-the-counter exchange at a regional center, and (3) next business day replacement direct from Sharp.

EXTRA also gives the user access to a toll-free telephone line for hardware and software advice. Dealers using EXTRA can telephone a special number that will download diagnostic routines into a computer; we can forsee the day when this will be made available to end users.

Pricing

The basic PC-5000 with 128K, MS-DOS, *SuperWriter*, and *SuperComm* sells for a suggested retail price of $1995. Other components are priced as follows:

128K Bubble memory	$269
Modem/dialer	349
Printer	399
Dual floppy drive	999
64K RAM upgrade	169
SuperCalc/SuperPlanner on 182K bubble	369

We see the most desirable configuration for portable use being the basic unit with printer and *SuperCalc* extra bubble memory—total cost, $2763. If it is your only computer, the floppy drives are probably necessary, for a total of $3762—rather heady for a portable compared to the TRS-80 Model 100, but quite a bargain compared to an IBM PC or high-end portable such as a Gavilan ($4000 plus) or Grid Compass ($8500 plus).

The Bottom Line

Frank Barbosa, general manager of computer systems at Sharp, confided to us that they were having a difficult time deciding how to position the PC-5000 in a 30-second TV commercial. Now, having used the machine, we see the problem. Is it a full-capability 16-bit desktop computer in a compact package? Sure is. Is it a notebook computer with full-size features and power? Yup. Is it a state-of-the-art machine with bubble memory, nifty modem, big LCD display, and whisper quiet printer in an 11-pound package? Right on.

That is not to say that the PC-5000 is perfect. It isn't. The cursor control keys should be arranged in a logical diamond pattern. It would be nice if the LCD screen were somewhat larger. The keyboard should have more support in the center and the CAPS LOCK key should give some indication of being depressed. And the software packages should be consistent from one to another.

But frankly, these problems are nits against the astonishing capability, speed, and memory capacity of the PC-5000. Furthermore, Sharp is a large, profitable company with an excellent service organization. The outstanding use of state-of-the-art technology coupled with well-proven software augers well for the success of the Sharp PC-5000. Would we buy one? You bet! END

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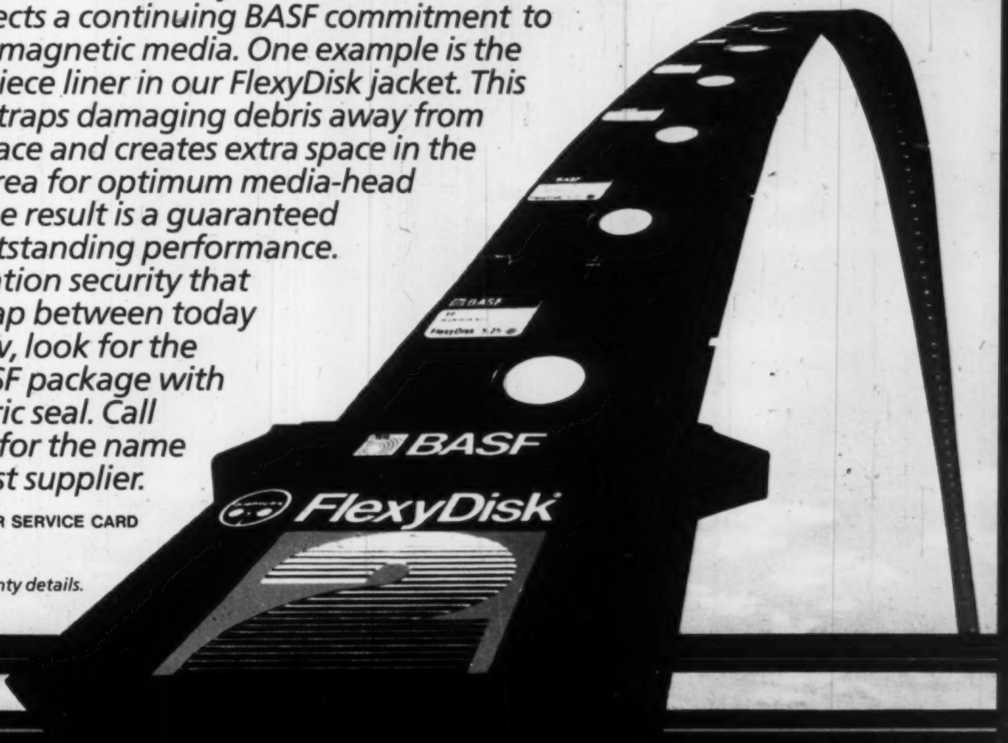

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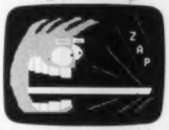

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*Software included with Touch Tablet varies with computer type.

The MicroOffice RoadRunner

creative
computing
equipment
evaluation

David H. Ahl

Apparently it is in vogue to delete the spaces between two words. We have been noticing this trend increasingly with software packages. But now we have the RoadRunner computer from MicroOffice Systems Technology with *SuperCalc* software. Well, perhaps we are saving lots of bytes of memory by not using those spaces, but, frankly, we don't think readability is enhanced. Be that as it may, the RoadRunner is a new entry in the notebook computer sweepstakes.

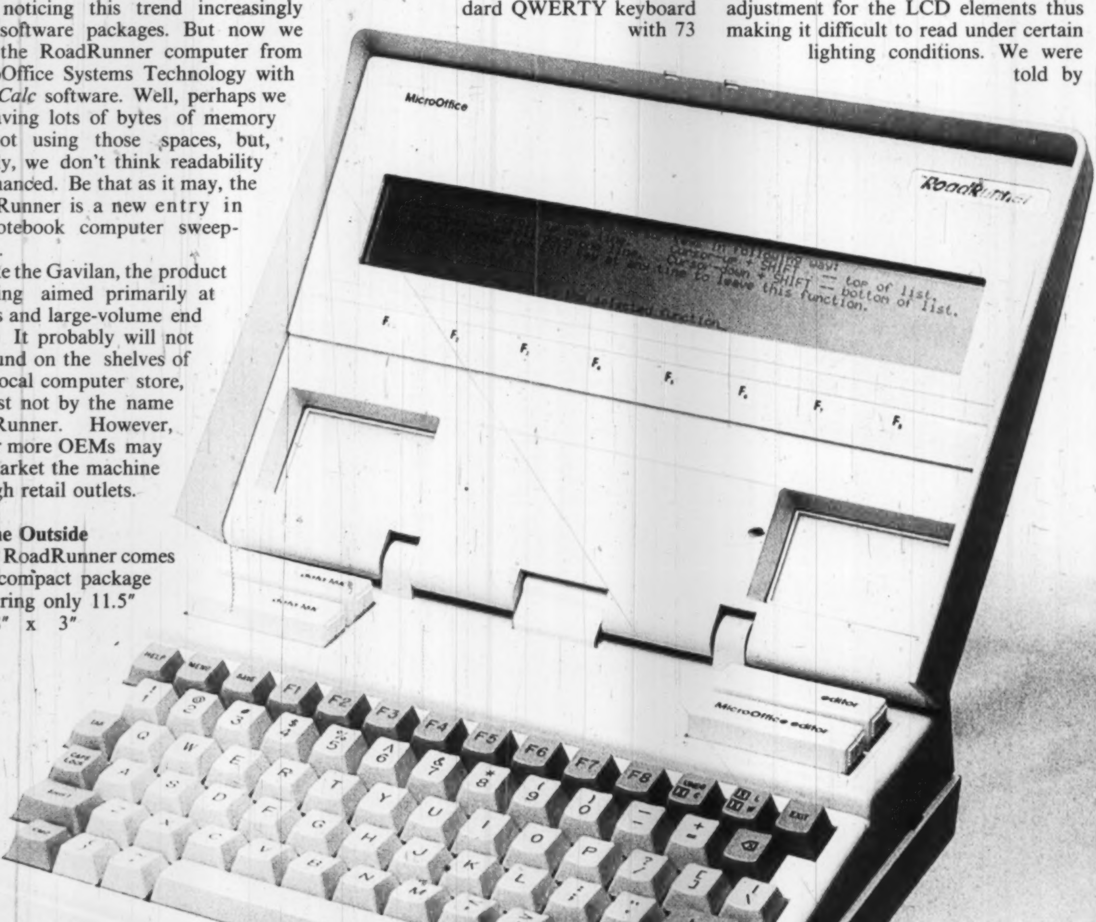
Like the Gavilan, the product is being aimed primarily at OEMs and large-volume end users. It probably will not be found on the shelves of your local computer store, at least not by the name RoadRunner. However, one or more OEMs may well market the machine through retail outlets.

On The Outside

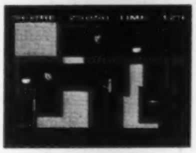
The RoadRunner comes in a compact package measuring only 11.5″ x 7.8″ x 3″ and weighing five pounds. When the display is opened, the machine automatically comes to life with a high-pitched beep and menu on the LCD display.

Opening the computer reveals an 8-line x 80-character LCD display, a standard QWERTY keyboard with 73 full-stroke keys and an extra row of 14 special keys at the top, and four small plug-in slots above the keyboard.

The active portion of the LCD display measures 1.3″ x 9.3″. It tilts back and forth, but does not have a contrast adjustment for the LCD elements thus making it difficult to read under certain lighting conditions. We were told by


MicroOffice
RoadRunner
Cursor-up + SHIFT -- top of list.
Cursor-down + SHIFT -- bottom of list.
line to leave this function.
selected function.
editor
MicroOffice editor
HELP
MENU
F1
F2
F3
F4
F5
F6
F7
F8
EXIT
SHIFT

WELCOME TO APSHAI.
YOU'RE JUST IN TIME FOR LUNCH.



Boy, have you taken a wrong turn. One moment you're gathering treasure and the next you're being eyed like a side of beef.

You're in the Gateway to Apshai.™ The new cartridge version of the Computer Game of the Year,* Temple of Apshai.™

Gateway has eight levels. And over 400 dark, nasty chambers to explore. And because it's joystick controlled, you'll have to move faster than ever.

But first you'll have to consider your strategy.

Is it treasure you're after? Or glory? You'll live longer if you're greedy, but slaying monsters racks up a higher score.

The Apshai series is the standard by which all other adventure games are judged. And novices will not survive.

They'll be eaten.

One player; Temple of Apshai, disk/cassette; Gateway to Apshai, cartridge, joystick control.

EPYX
Temple of Apshai
EPYX
Gateway to Apshai

EPYX
COMPUTER SOFTWARE

STRATEGY GAMES FOR THE ACTION-GAME PLAYER.

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*Game Manufacturers Association, 1981

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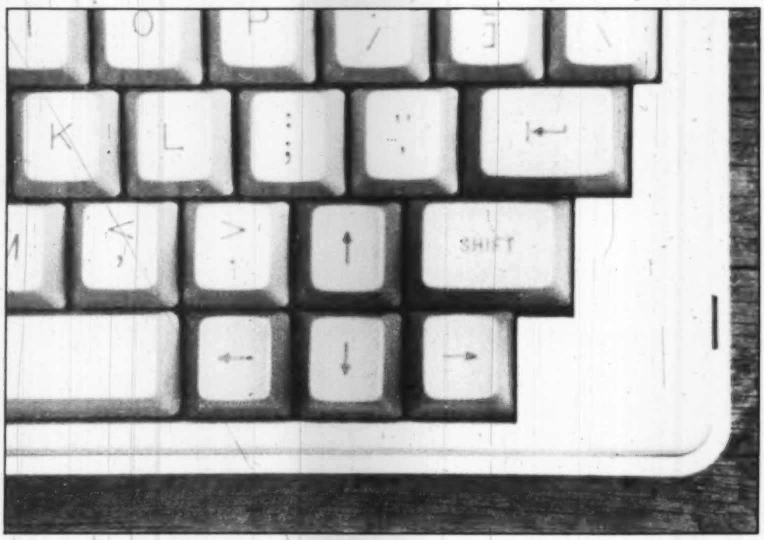
MicroOffice that production models would include a contrast knob.

Characters are quite small on the display, about the same size as dot-matrix printer print. Characters are formed within a 5 x 7 dot matrix with one row of dots between lines; there are no letter descenders. Thus, readability of a full screen of text leaves much to be desired. The screen has 64 x 480 individually addressable pixels.

According to the published specifications, 255 characters can be displayed. Perhaps so, but we ran a short program to display all the CHR$ characters and counted only 221 different ones. Frankly, that's a nit since the RoadRunner provides all the foreign letters and graphics symbols you would ever want.



Cursor control keys are arranged in a logical pattern, but unfortunately the up cursor key is where the question mark is usually found.

Full-Stroke Keyboard

The keyboard has a good feel with no give in the center. The keys are concave sculpted with a matte finish. Alphanumeric keys are light tan with dark brown markings while control keys are a darker tan. This subtle color scheme is carried throughout giving the RoadRunner an attractive, contemporary appearance.

Unfortunately, MicroOffice has followed the IBM school of keyboard layout, i.e., pepper the keyboard with extra keys in unexpected places. Next to the M on the bottom row, we expect to find a left arrow, right arrow, question mark, and SHIFT. The RoadRunner puts the up cursor key in place of the question mark (the other three cursor keys are to the right of the spacebar). It is nice that the cursor keys are in a logical pattern, but what an ill-chosen location!

creative computing
HARDWARE PROFILE

Product: RoadRunner
Type: Notebook portable computer
CPU: 8-bit CMOS Z-80, 2.5 MHz
RAM: 48K (optional 16K and 32K RAM packs)
ROM: 16K
Keyboard: 73 full-stroke keys
Display: LCD, 8 lines x 80 characters
Graphics: 64 x 480 pixels
Ports: Bus extender, RS-232, modem
Dimensions: 11.5" x 7.8" x 3"
Documentation: User's Guide
Summary: Notebook portable with removable memory cartridges, 8-hour battery pack, and CP/M built in. Basic, spreadsheet, and text editor available.
Price: $1695
Manufacturer:
MicroOffice Systems
Technology, Inc.
35 Kings Highway East
Fairfield, CT 06430

The CMD (control) key is under the right SHIFT and is all-too-easy to press inadvertently bringing on all kinds of undesirable results.

On the other hand, millions of people tolerate, perhaps even like, the keyboard on the IBM PC, so perhaps we are being overly harsh toward this one. Acutally, it is more standard than that on the IBM PC, so it is likely that RoadRunner users will adjust after a week or two.

On the top row are several special keys including HELP, SAVE, and MENU (functional in most software packages). Next come eight function keys which have default meanings in most software packages, but which also can be set by the user from either Basic or CP/M. Keys to delete, insert, and exit programs are to the right of the top row.

Memory Cartridges

The standard RoadRunner comes with a 16K of ROM and 48K of RAM built in. The built-in ROM contains a CP/M-compatible operating system, and editing, scheduling, phone directory, and terminal emulation (DEC VT100) software.

Four slots labeled A to D are provided above the keyboard into which memory cartridges can be plugged. Cartridges can be blank or contain software. Currently available are 16K blank cartridges; 32K and 64K ones are promised later.

Each cartridge measures just 2.5" square and weighs one ounce. It contains CMOS memory and a lithium battery which will keep the memory refreshed for five years.

Software packages such as Microsoft Basic and Sorcim *SuperCalc* are also available on cartridge.

Unfortunately, MicroOffice has followed the IBM school of keyboard layout.

Each of the four slots is addressed just as though it were a disk drive. Although a 37-pin bus connector is accessible at the back of the machine, no floppy disk unit is available or even promised for the RoadRunner. The design philosophy seems to be that if you need a disk unit, the RoadRunner can easily be connected to another machine—we saw it done with an IBM PC—and data up- and down-loaded through the RS-232 port.

On The Inside

The RoadRunner uses a CMOS version of the Z80A running at 2.5 MHz. Thus, we would expect performance similar to the NEC 8201 and, indeed,

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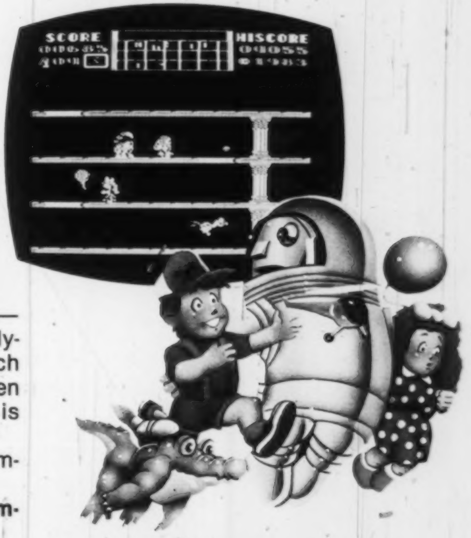

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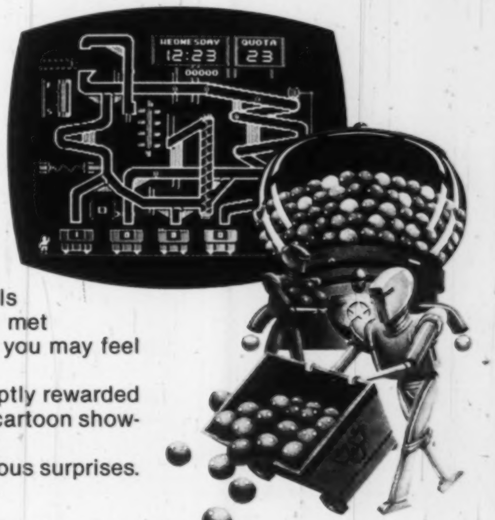

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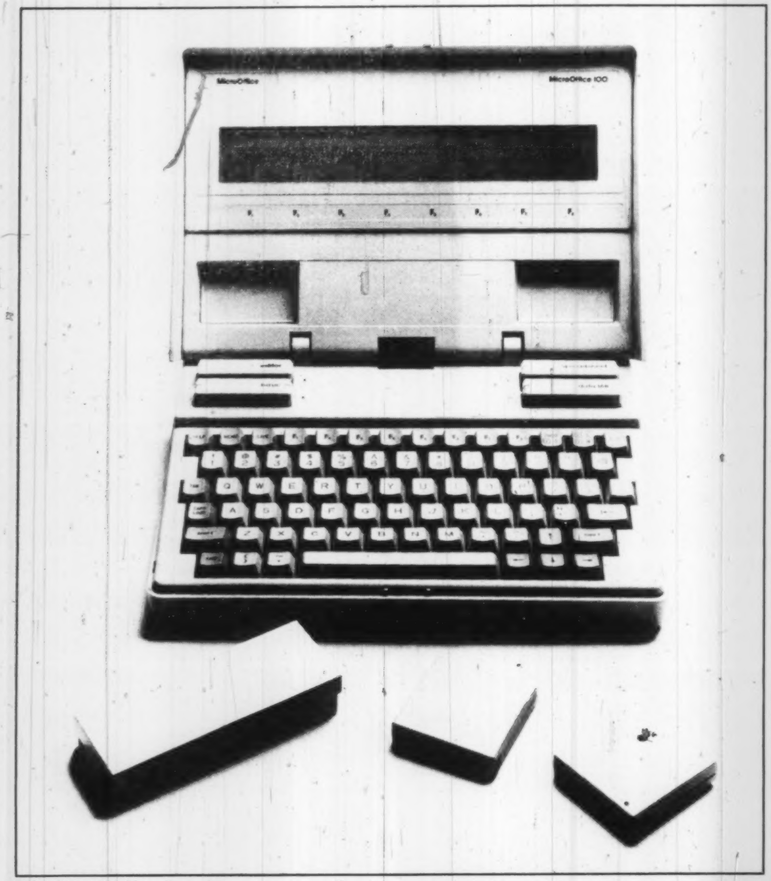

The MicroOffice RoadRunner opened up. In the foreground are a battery pack and two memory cartridges.

the time to run our standard benchmark was virtually identical.

The machine has a real-time clock which can be programmed to "wake up" the computer at a specified time.

Connectors are provided in the rear of the unit for the main bus (for parallel devices, but alas, no printer interface is available), RS-232 serial devices, and modem module.

A battery compartment holds a removable 10-ounce NiCad battery pack. The RoadRunner will run approximately eight hours on a fully-charged battery which we are told will recharge "overnight;" no exact time is given.

Communications

A compact modem module which plugs into the back of the machine is available. It is a 300-baud direct-connect modem with auto-dial, auto-answer, and a wake-up mode of operation. This means, for example, that the computer could be set to wake up at 2:00 a.m. and send the daily sales report back to the computer at the home office.

Built in to the operating software is a terminal emulation mode which imitates a DEC VT100 terminal. In this mode, the computer can talk to many timesharing systems as a hard-wired terminal. It is not likely that one would wish to use the machine in place of a VT100, but this is another way to up- and down-load data from a larger host machine.

The machine has a real-time clock which can be programmed to "wake up" the computer at a specified time.

Software

As mentioned, the basic RoadRunner comes with a "CP/M 2.2 compatible" operating system. Why not just CP/M 2.2? Because, we are told, the RoadRunner operating system has a background print capability, and regular CP/M does not. However, all (?) CP/M software will run on the machine, as long as there is sufficient memory.

The scheduling and name/address/phone directory capability are similar to those on the Tandy Model 100. We

When closed, the RoadRunner fits easily into an attache case.

haven't found these especially useful, particularly since they devour memory like crazy, but perhaps other people do. The DEC VT100 terminal emulator is also built in.

Included with the basic machine is a text editing cartridge, MicroOffice 100 Editor. This is a more than adequate text editor. It is always in insert mode (like the Model 100), but it has several unexpected features such as character, word, and line delete, and global search-and-replace.

With the MicroOffice Editor, when the screen is full, it pages up seven lines, so the previous bottom line becomes the top line on the next screen.

The definitions of eight function keys can be toggled on and off on the bottom row of the display. We found the functions understandable and sensible, even without an instruction manual (the ultimate test).

Microsoft Basic is available as an extra-cost ($175) software package. It is the standard Z80 implementation except that the version we used did not have on-screen editing. The folks at MicroOffice said this may be available later.

Sorcim *SuperCalc* is also available as an extra cost ($275) option. We did not have an opportunity to try it out.

MicroOffice tells us that many software suppliers are planning to convert their packages to the machine. The availability of CP/M should make this fairly easy, so we would expect to see many more packages in the not too distant future.

With the text editor, spreadsheet program, scheduler, and communications capability, you truly have a portable office.

Servicing

The RoadRunner comes with the usual 90-day limited warranty. At the moment, no field service facilities are planned. Faulty machines must be mailed back to Fairfield, CT for repair or replacement.

Pricing

The basic RoadRunner with AC charger/adapter, blank 16K data cartridge, text editor cartridge, soft carrying case, and manual has a suggested list price of $1695.

The modem module costs $240; Microsoft Basic, $175; and Sorcim *SuperCalc*, $275. For a limited time, the RoadRunner plus these three extras (total $2385) is being offered for an introductory price of $1895.

A 16K cartridge costs $90 and an extra battery pack costs $25.

An Office On The Road

MicroOffice positions the RoadRunner as an office on the road, and the description is apt. With the text editor, spreadsheet program, scheduler, and communications capability, you truly have a portable office. With a weight of only five pounds and the compact data cartridges, you will be tempted to carry the machine everywhere.

We wish the keyboard layout could have been more standard and the display could have been larger with more room between the lines and lower-case letter descenders. We would have liked a Centronics parallel printer output too.

On the other hand, MicroOffice has done most things right. Now, how do we become an OEM so we can get a machine of our own? END

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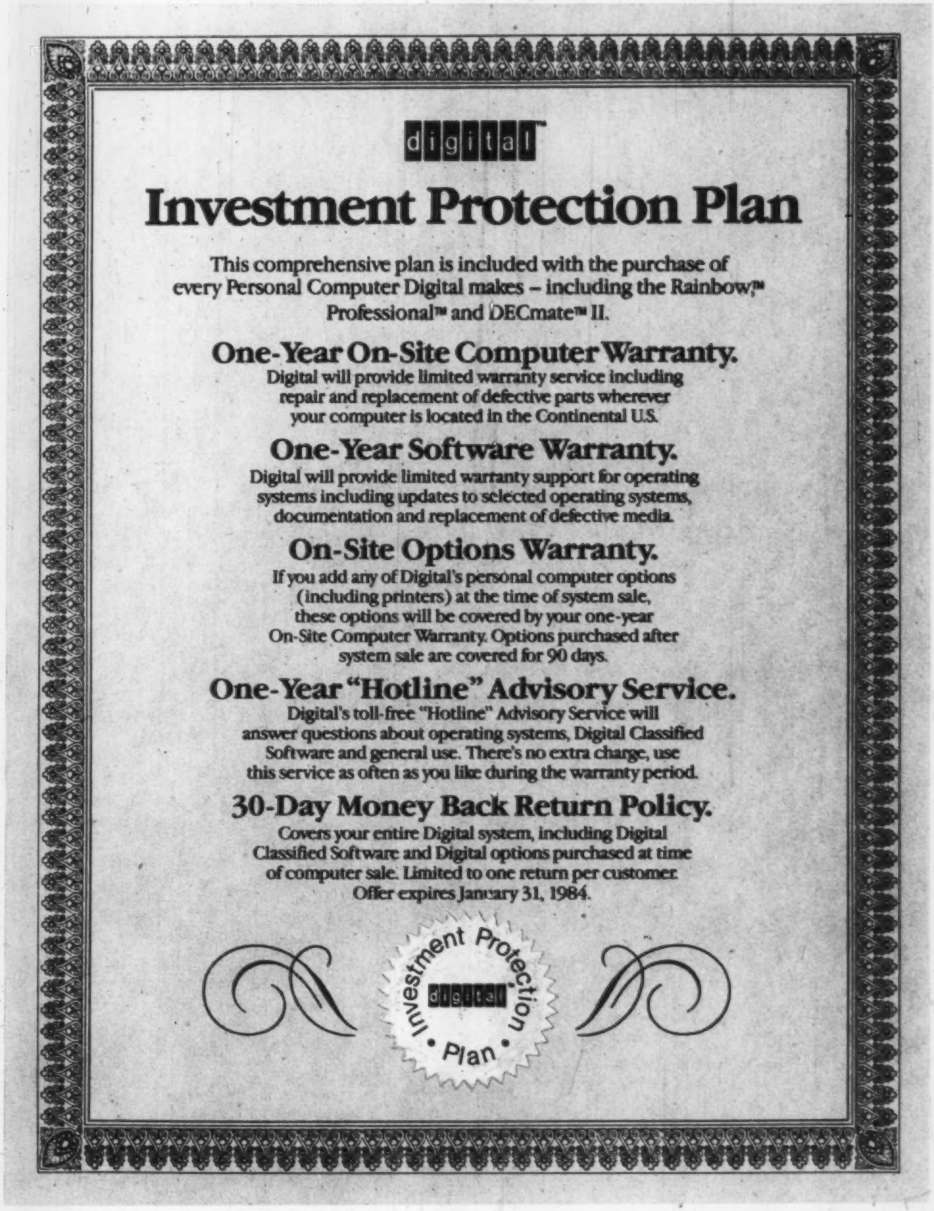

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The Teleram T-3000

Steve Arrants

Within the past year, portable computers have exploded onto the market with such force, that many people are reminded of the introduction of the first TRS-80 and the Apple I. Already, there is a handful of magazines devoted solely to the portables.

I am not talking about the "sewing machine" portables. Sure, you can fold them up into one neat box. But have you ever tried to carry an Osborne from the gate to your aircraft? The true portables, notebook size units, offer portability and meet a user's minimum needs.

All portables have one thing in common—a flat screen for display rather than a CRT. Different technologies are available, with LCDs and electroluminescent displays predominating. LCD display is found on the TRS-80 Model 100, NEC PC-8201, Epson HX-20, Radio Shack Pocket Computers, and other models. The sole exception is the Compass Computer from Grid Systems which uses an electroluminescent display. This type of display offers a superb image, though the trade off is power consumption. The Compass cannot operate on batteries.

Perhaps the most obvious thing differentiating the various notebook

TELERAM 3000
CARRIER
LOW BATTERY
ERROR

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HARDWARE PROFILE

Product: Teleram T-3000

Type: Notebook portable

System: CP/M, Microsoft Basic

Specifications: Z80L CPU, 64K RAM, 4K ROM 128K bubble memory. 4 x 80 LCD display, 5 x 7 matrix, full ASCII keyboard, 16 function keys. RS232C serial port. 8.75 lbs., 13" x 9.75" x 3.45". Articulating display, communications software, CP/M utilities.

Performance: Very easy to use. Communications program is excellent.

Ease of Use: Very easy.

Documentation: User's Guide CP/M reference book are excellent.

Price: $2,495

Summary: You get a lot for the price, but the competition offers more for less. The bubble memory is flawless, expandable to 256K.

Overall Mark: B

Manufacturer:
Teleram Communications Corp.
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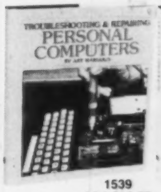
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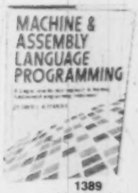
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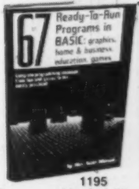
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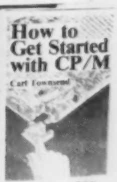
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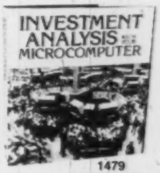
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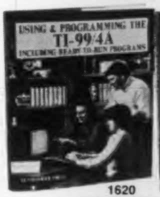
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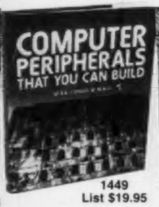
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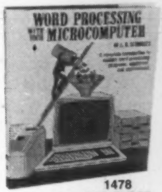
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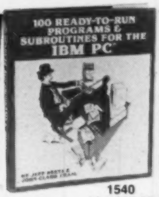
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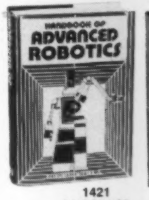
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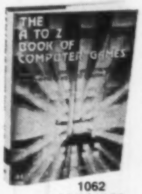
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CC-184

computers from one another is the size of the display. Obviously, there are many other variables, but it is the display that one sees first. Some computers such as the TI CC-40 have a single-line display of 31 characters, some have a four-line by 20-character display, while several sport an eight-line by 40-character display. In general, the later entries have larger displays.

The Teleram 3000 is an exception. It was one of the earliest notebook computers introduced. It hit the market back in the neolithic age of portables, July 1982. Yet it has one of the larger displays—four lines of 80 characters each.

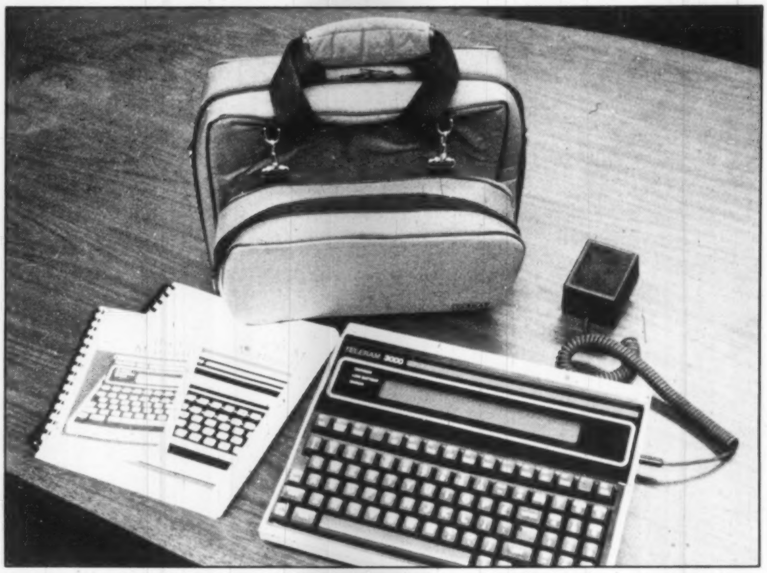
That doesn't mean that it can be used for graphics, however. The active area of the display is only 0.8" high, hardly enough for any kind of detailed plot. Nor is it—or any of the notebook computers—much good for screen-oriented games. Even spreadsheets are a bit of a problem—your window on the entire sheet is very small.

The most ideal applications for a notebook computer are light word processing and communications. Although the small display is a bit of a problem, it can be largely overcome with scrolling. How many times have you wanted to take your Apple to the library while doing research? How about writing an article, story, letter, or memo while away from the home or office? The small handhelds can not really do this. Notebook computers can. Unfortunately, most notebook computers are not, as yet, capable of true word processing. The exception is the Teleram machine.

What Makes The T-3000 Different?

At 13" x 9.75" x 3.45" and about 9 pounds, the T-3000 is not the smallest or lightest portable available. The display of 4 lines x 80 characters in an 8.25" x 0.8" window is smaller than that of the Model 100. Letters are formed in a 5 x 7 dot matrix and do not have descenders. The display can be adjusted to five different viewing angles, and there is a contrast control so it offers good visibility. The built-in 128K bubble memory is expandable to 256K. This is not RAM memory, but an emulation of drive A under CP/M.

The bubble memory of the T-3000 can equal the storage of one 8" floppy. It is non-volatile, i.e., when the power is off the data are permanently retained. When not in use, the bubble memory power is off, extending battery life. 64K RAM, 4K ROM, and a low power version of the Z80 microprocessor are standard. Here is where the T-3000 bests the Model 100. With 128K of storage built in, 64K RAM, and CP/M, the T-3000 is a *full-fledged* computer in a small package.



Teleram T-3000 with case, manuals and charger.

The keyboard has 83 standard keys, including a 12-key numeric keypad, which also functions as a cursor controller, and 16 programmable function keys. The keyboard "feel" falls somewhere between that of the Apple IIe and the Osborne I. There is little keybounce, and the placement is intelligent. The function keys are preprogrammed with CP/M commands and utilities. You can reprogram keys with the KEYDEF utility. The cursor control keys are accessed by pressing SHIFT LOCK to switch the numeric keypad into the cursor mode.

The Teleram 3000 was one of the earliest notebook computers introduced.

A thoughtful touch, not found on any other notebook computer, is the LED indicators on the SHIFT LOCK and CAPS LOCK keys which are illuminated when the keys are "on."

The power switch is located on the back of the right side of the T-3000. It also functions as another angle adjustment for the display. On the back left side is a standard RS-232C interface for connecting to a modem or another computer.

On the rear of the computer is an interface bus called teleConnect.

TeleConnect is a high-speed parallel interface which connects peripherals such as CRTs, disk drives, and Teleram's 3500 Office Station. This is an "intelligent" interface, requiring little set-up or operator intervention. When power comes on, each connected device is identified and logged-into the system. They can be called into service via the CP/M Assign utility.

Using The T-3000

Flip the power switch, and the T-3000 enters a self-test mode. In about five seconds, the familiar CP/M prompt is presented. Choose utilities, MBasic, or the teleTalk communications program and begin. One glaring omission in the T-3000 is the lack of a word or rudimentary text processor. The CP/M utility Ed is available, but using it for text editing is more trouble than it is worth.

Instead, I copied a version of *WordStar* onto the bubble memory. (A text editor is available with the Teleram T-3100.) Had I needed a spreadsheet or database software, I could have done the same. Just connect the T-3000 with another computer running CP/M and transfer the software.

WordStar is not my favorite word processor. Using it on the T-3000 made me like it even less. However, it ran with only minor problems, and I was able to write some text with it.

TeleTalk

Included with the T-3000 is a software package called teleTalk. This is an advanced data communications system designed for use with the T-3000 CP/M operating system. Basically, teleTalk provides "smart" terminal, auto-dial, auto-answer, data capture and dump, and error-checked file transfers between the T-3000 and another computer system.

Telephone numbers and other parameters, such as commands, key definitions, passwords, account numbers, and baud rates may be stored in command files.

The data capture feature lets you capture data in a buffer and store it on disk or in bubble memory. This is helpful if you are connected to an on-line service such as CompuServe where connect time is charged by the minute. Using this feature lets you dial up, capture the needed information, and log-off quickly.

This captured information may then be edited or printed off-line. You can also prepare a message or program for uploading and use teleTalk to call up a remote system and then send the file at full speed.

TeleTalk is interrupt-driven. That is, you can use it at terminal speeds of up to 2400 baud with no character loss. Slow printers may be driven at higher than normal speeds without data loss.

The file transfer capabilities are impressive. The complete error checking of the program assures reliable exchange even when disk systems or operating systems are incompatible. Any file can be transferred, including CP/M .COM files and word processor text files. File size can be as large as an entire disk—a feature most other terminal programs don't offer.

Groups of files can be transferred at one time, using a wild card file name. Instead of entering each text file name one at a time, you just enter *.TXT. All files with the .TXT extension are queued for transmission.

TeleTalk consists of two files: the actual command file and a help file. The help file is excellent, explaining all commands and their variations. TeleTalk is one of the easiest communications packages to use. I rank it higher than the program available on the TRS-80 Model 100.

Documentation

The documentation consists of two manuals. The first covers the use of the T-3000 and its associated programs. It is well organized, well written, and presented logically. The manual assumes no prior knowledge of computer use, and helps dispel first-time user anxiety. Although some sections are a bit wordy, you should be up and running in a short time.

Also included is a manual on CP/M. This is a mystery. The CP/M manual is very technical and could cause confusion. I doubt that many of the businesspeople from whom the T-3000 is intended actually care to learn CP/M.

Cons and Pros

I have mixed feelings about this machine. The T-3000 offers a great deal of power and storage. I think that including MBasic, an assembler, and other CP/M utilities was a waste of memory. The user for whom the machine is intended—the business user—will not use them. It would have been much better to include a text editor, a spreadsheet, and memo/address program. A built-in modem would also have been a great idea. As it is, a Novation Cat acoustic modem is included, making the T-3000 less portable. Another I/O port is needed, in addition to the RS-232 and the teleConnect ports, such as an external video interface or disk interface. The price of $2995 is at the high end of the notebook market.

The T-3000 in its carrying case.

I did like the articulating LED screen which made it very easy to read. And the CP/M operating system allowed me to use a variety of software. The 128K of storage is a great feature, though CMOS cartridges seem to be where the market is heading. The T-3000 is a powerful machine. It is an impressive machine. But with the market advancing so quickly, it is now possible to get similar features at a lower price. But perhaps with a bit of re-design and a drop in price, the Teleram T-3000 could have a place in the notebook market. END

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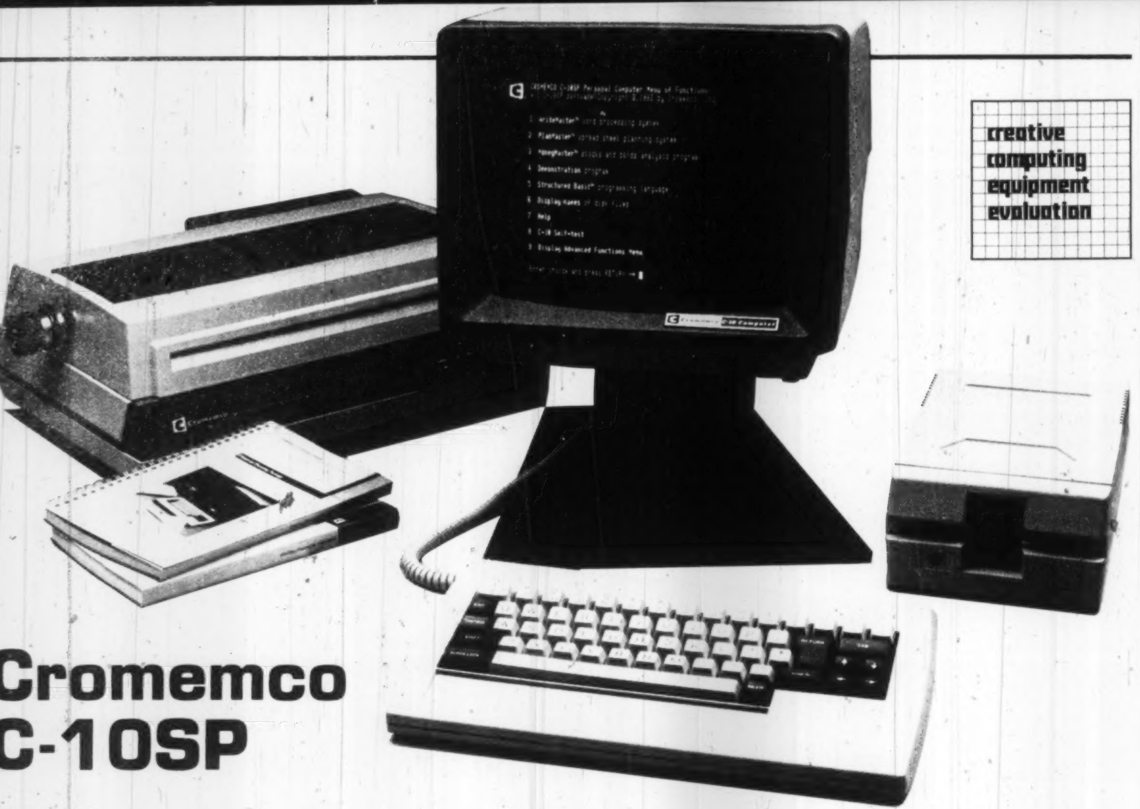
Demonstration program
Structured Basic* programming language
Help
C-10 Self-test
Display Advanced Functions Menu
C-10 Computer

Cromemco C-10SP

David Hilton

Updated software for the C-10SP, delivered to us as we went to press, appears to offer significantly improved performance. This review will give you a good feel for the system, but be sure to ask for a demonstration of the latest software before you buy.

The C-10SP is the latest entry from Cromemco, one of the oldest and most respected manufacturers of small business-oriented computers. This addition to the low end of Cromemco's line represents a good value at $1785 for a bundled package of hardware and software. It also has some excellent features, and a few not-so-excellent ones. Let's have a look and see whether it might be the computer for you.

Display

The CRT is a 12" unit coated with P-31 phosphor. The image delay provided by the P-31 is one of the best features of the C-10. The character display is 25 lines of 80 characters each.

There are four character sets in ROM, but the documentation lacks any instructions on how to get to them. The pixel graphics mode provides a display of 160 x 72, and full graphics mode offers 720 x 384.

The character display is very clear in the center of the screen, bleeding to a slight fuzziness around the edges. The edges of the screen display also contract about ⅛" each time the disk drive is accessed.

CPU

The heart of the computer is a Z80 microprocessor with a 4 MHz clock. The standard configuration includes 64K of RAM and 24K of ROM. Resident in ROM are a disk boot routine, self-test routines, and the CROS, a firmware resident monitor.

The main system unit sports a disk interface port, an RS-232 port with a DB25 connector, a computer port with a DB9 connector, and the keyboard port, which uses a telephone type plug. The unit is not portable in that it does not have handles, but it is certainly light enough to be transported from place to place when necessary.

Keyboard

The keyboard that is supplied with the C-10 is also lightweight and compact. The two rubber-tipped bolts which are provided as height adjusters are inadequate, however. As the keyboard is used, the bolts revolve and the unit creeps away from the user. And since they do not revolve in unison, they soon get to be different lengths, which causes the keyboard to rock.

I solved the problem by threading a nut onto each bolt and using it as a lock-nut to hold the bolts in place. I also glued a piece of rubber to the bottom of the keyboard case to help hold it in place on the desktop.

David Hilton, 503 Golf View Dr., San Jose, CA 95127.

creative computing
HARDWARE PROFILE

Product: Cromemco C-10SP

Type: Business-oriented computer

System: Z80A, CDOS, 64K RAM, 24K ROM

Specifications: 12" x 10" x 16", 25 lbs.

Performance: Fair because of slow disk drives.

Ease of Use: Very good with some software packages.

Documentation: Adequate

Summary: Reasonably priced CP/M system.

Overall Mark: Fair to good

Price: $1785

Manufacturer:
Cromemco
280 Bernardo Ave.
Mountain View, CA 94039

The key configuration is the normal QWERTY with some added features. There are four cursor control keys in the lower righthand corner. The TAB key is immediately above them. DELETE is in an unusual, but not awkward, position to the right of the spacebar. ESC is next to the Q. Below it is CONTROL (in red), and below that in the normal position is the SHIFT key. ALPHA LOCK is below SHIFT.

The equivalent of function keys is achieved by striking combinations of the number keys, CONTROL, and SHIFT.

Other customizable features include toggling of the audible click and changing the rate of auto-repetition. The M, J, K, L, U, I, O, 7, 8, and 9 keys can be made to function as a numeric keypad simply by pressing CONTROL-SHIFT-N, and the SHIFT key produces lowercase letters when the ALPHA LOCK is engaged. There is an undocumented status line which appears at the bottom of the screen when CONTROL-SHIFT-S is pressed.

Disk Drives

The disk drives are double sided, double density 5¼" drives with a storage capacity of 386K each. They are reasonably quiet and generate very little heat. The system can accommodate a maximum of two drives, and the operating system automatically senses the number of drives attached. All of the software packages tested worked equally well with either one or two drives.

Other Hardware

The CLQ is the letter quality printer Cromemco sells to complement the C-10. It is nothing fancy, just a solid, reliable printer, which represents a good value for the $795 retail price.

The optional second disk drive sells for $595, an average price for additional drives.

Documentation

All information about the C-10, CROS (Cromemco Resident Operating System), and CDOS (Cromemco Disk Operating System) is provided in the 170-page user manual. The sections on setup are excellent, and there are very nice examples to follow for using the utilities and a glossary and index for quick reference.

The manual provides 35 pages of setup information along with some good advice on the proper care and feeding of a computer system. This information, along with a set of unique cable connectors, removes the guesswork from the setup procedure.

Some topics, however, are simply ignored by the manual. For example, when you do a DIR on the distribution disk, you see EWS as system attributes. In the attribute command section of the manual, E, W, and R are described; S is not. All of the hardware and software manuals associated with the system suffer from the fact that the development of the system and applications software has outstripped the documentation. Hence, there are many undocumented features.

The user manual is devoid of technical information. Cromemco apparently assumes that the average C-10 user will neither need nor understand the details of the inner workings of the machine. A technical manual is available to dealers and owners who specifically request it.

Software

Software for the C-10 is of four types: ROM code, operating system, operating system facilities, and application packages. As mentioned above, CROS is contained in 24K of ROM. It provides for examining and changing the contents of memory, reading and writing to the I/O ports, reading and writing to physical locations on the disk, booting CDOS, executing programs at the machine code level, and running system test routines. CROS also provides the user with the ability to configure the I/O port connection so the C-10 can be used as a terminal. CROS does not have a debugging facility or any assembly language features.

The damning question is: why do the Master programs jump outside of themselves so often?

Also contained in ROM is the system initialization sequence, which is run when the computer is turned on. Part of this sequence sets the contents of RAM to EF hexadecimal, which is a processor "Restart 5" opcode which causes the Z80 to branch unconditionally to memory location 28 hex. This RST 5 is the mechanism for activating a feature of the C-10 which the user sees all too often while running *PlanMaster* and *WriteMaster*: the System Trap.

Like a wumpus in its cave, this cold-hearted critter lurks within the functions of the Master series. The Trap is activated when the processor tries to execute an instruction outside of the body of the currently running program. This is fine. It protects the user from some strange results when things run amok. The damning question is: why do the Master programs jump outside of themselves so often?

The machine code seems to have some basic fault that causes it to try to execute outside itself. Like the safety on a firearm, this sort of safeguard is nice to have, but you should not have to rely on it. The operation of the Cromemco C-10 depends on the System Trap.

CDOS

CDOS is a CP/M look-alike written by Cromemco specifically for their Z80-based machines. Like CP/M, it includes resident commands: DIR, REN, TYPE, ATTR, *, PRINT, and L. DIR and L both provide a list of the files on the current disk. File size and remaining free storage is displayed at the end of the file list.

REN and TYPE are the same as their namesakes in CP/M. ATTR is unique to CDOS; it allows the setting and resetting of file attributes; E for erase protectr, W for write protect, R for read protect. The aforementioned undocumented S is said to be programmer specifiable.

The * command runs the utility called Menu, about which more later. The CONTROL-P printer toggle function of CP/M is duplicated in CDOS in addition to the PRINT command which is identical to TYPE, except that text appears on the printer rather than the screen. These resident commands and any runable program may be specified to CDOS in upper- or lowercase.

CDOS has the built-in capability to execute a program at boot time. The mechanism is a special case of the BATCH command: any time CDOS is run, it looks for a file named STARTUP.CMD. If one exists, CDOS processes it.

There is partial compatibility between CDOS and CP/M. The manuals do not list the conditions which determine it, so compatibility must be determined empirically.

Menu

Menu is the utility that forms the heart and soul of the C-10 for the beginning user. CDOS automatically runs Menu when the computer is turned on (after looking for STARTUP.CMD), thus insulating the unsophisticated user from the operating system. Two screens offer the user 18 choices of programs to run. A program not on the menu may be run by typing in its name instead of a menu selection number.

If a program is entered from the menu, CDOS returns to Menu when the program exits the system. Sometimes the Master programs like to return to Menu when they are not supposed to—that is, when they don't feel like taking the user through a System Trap. I found it necessary to erase the Menu program from the disk to shorten boot time and eliminate the penalty for reloading Menu after each command.

CopyDisk

CopyDisk formats and moves the system tracks to a new disk, copying the contents of the data tracks as an exact image of the source disk. It cannot copy without first going through the formatting and sysgen stages, however. This means that every disk in use has the system tracks active and that disks are reformatted often.

There is no real problem with this procedure except that it means that the total time required to run CopyDisk is well over seven minutes. In a single drive system, it takes even longer, because the user must physically change disks for each of the nine passes that it takes to copy the whole disk. The whole process is entirely too time-consuming to be practical.

Fortunately, there is another utility provided for file copying. CopyFile performs the same disk-to-disk file transfer functions as the PIP program in CP/M. Wildcards are allowed, and files can be copied in both single and dual drive systems. CopyFile is a nicely written program that can be invoked with a parameter string. It does, however, offer the necessary prompting if it is invoked without parameters. It is one of the nicest programs in the system.

ChekDisk

ChekDisk performs two functions. First, it can be used to check for overlapping files. The documentation states that if overlapping files are found, ChekDisk will inform the user of the appropriate corrective action. I was unable to verify this statement, because I never presented the system with an overlapping file.

The second function of ChekDisk is to read the complete disk while checking "disk integrity." I assume that this means it is checking for bad formatting, bad address mark CRC errors, and bad data mark CRC errors. I was unable to verify this as well. The only error message I ever got from ChekDisk was: Home error: Driveb:, Cylinder, Surface 00, Sector 0a, Status-34. I subsequently erased ChekDisk from all but the distribution disk.

Batch

Batch allows you to string together as many lines of CDOS level commands as you want. These commands are then processed without any further interaction with the user. The user can create files with the extension .CMD as lists of these CDOS primitives for future or repeated processing. Batch is not included in all releases of CDOS.

Printer

Printer is an interactive program which sets up the assignments for the logical printer. It has pre-defined selections for a variety of printers, both parallel and serial. This is somewhat confusing as the C-10 has only a serial printer port.

Structured Basic

Beginners won't get into Structured Basic very often, but for anyone who has ever wanted something extra in his Basic, it is here: Tracing, built-in editing, Boolean operators, long and short floating point, while-end-while, extensive output formatting, extensive I/O driver control, partitions, procedures, error handling, external library functions, the list goes on and on—long enough to satisfy the desires of any Basic programmer. The 311-page Structured Basic manual contains everything a user needs to know about the language as well as the only clues about the insides of the C-10 that you can find in the standard documentation.

"Ok, Billy, put away your 'Hologram' game and come sit with grandma while she visits!"

Bright

The normal video display of the C-10 consists of light characters on a dark background. Both the intensity of the character display and the intensity of the background can be varied over a scale of 16 settings.

Some of these settings are not very useful. Having both foreground and background at the same setting makes the characters hard to distinguish. On the other hand, the display can be tuned to whatever brightness and contrast suit the eyes of the user and the ambient lighting. Bright is the utility that makes this possible.

Screen

The user who wishes to enter text into the C-10, either as a document or as a source code file for a language, has a choice of two text input systems, *WriteMaster* and Screen. Screen is a quick, clean, and delightful two-dimensional screen editor. It is several notches above the typical line-oriented editors often distributed by manufacturers but not quite equal in complexity or functionality to a full blown word processor.

Screen is the best all round "standard equipment" editor I have seen. It maintains a banner across the top line of the display which shows all the available options. As an option is chosen, the banner changes to prompt the user for the correct input for that option.

Screen is also clever enough to protect the unwary user who creates a file that is too large for the available disk space. Left and right margins as well as paragraph indentations are selectable, and the BEAUTIFY command reformats the text. Screen is another of the good things in the C-10SP package.

MoneyMaster

Now we come to the biggies, the Master series: *MoneyMaster*, *PlanMaster*, and *WriteMaster*. *MoneyMaster* is a Basic program. It is also the one true application program in the C-10 system. It performs six financial analysis functions:

- Stock market analysis
- Stock buy price analysis
- Bond yield-to-maturity analysis
- Bond buy price analysis
- Real estate after tax yield analysis
- Equipment purchase time until break-even analysis

Each analysis is branched to from an

opening menu. All necessary input for each routine is prompted for and error checked. Allowances have been made for inconsistent input structures; where a dollar amount is expected, for example, the program doesn't care if a dollar sign is typed or not. It is, however, possible to overflow the capacity of the program for handling out of range numbers. If this happens, the program bounces the user back to CDOS.

MoneyMaster is useful for getting a sense of the growth or diminution of an asset over time.

PlanMaster

PlanMaster is Cromemco's electronic spreadsheet for the C-10. The user of *PlanMaster* works within a fixed structure which is made up of ten *plansheets* each of which is limited to 31 rows and 13 columns. The user may choose as many of the ten plansheets as he wishes for each plan. He may also choose the number of rows and columns that best fit his data.

The rows and columns always appear on the display, but when the matrix is printed out, only the labeled ones are printed. Columns can range in size from four to 16 characters wide, and each column can be declared to contain hexadecimal, normal, or scientific numbers. In normal and scientific modes, the user can select the number of decimal places from the range zero to six.

Each of the ten sheets in each plan can have one and only one *define screen*. The user must design the plan so that he will never need more than 24 lines of calculations for each 13 x 31 sheet. Fortunately, cell values can be passed between sheets in a single plan. If the definitions calculate a number too large for the size field selected, *PlanMaster* places #### in that field on the sheet and offers the user a chance to widen the field.

The program is easy to use for those whose requirements fit within the limitations it sets forth. *PlanMaster* is, however, a flaky program. It hangs, for example, if too many column widths are changed without saving the format, and it sends the user to the System Trap under circumstances that cannot be consistently reproduced. Occasionally, it copies either too much or too little information back and forth between sheets in a single plan. Sometimes it fails to read back in the data and format files that it has just written out.

I suggest that those who choose to use it follow the instructions contained in the Help functions, as they are more correct and current than those in the manual.

PlanMaster is suitable as a tool for learning about spreadsheets. Its simple form allows for a steep learning curve for the first time user. I suspect, however, that anyone who is serious about using an electronic spreadsheet will want to look elsewhere.

WriteMaster

By far the most worthwhile program in the C-10SP package is *WriteMaster*.

WriteMaster abounds with helpful little features which by making the program more forgiving of the user's mistakes, makes him more forgiving of its mistakes. For example, if the user runs out of disk space, *WriteMaster* displays the disk directory and leads him through a deleting session that allows him to clear sufficient space to save his text.

In edit mode, single keystrokes produce boldface, underlining, and centering.

Among the most useful functions included in the program are the FIND and REPLACE commands. Using FIND or REPLACE causes the 24 "function keys" to be redefined temporarily for special use within those commands. Wildcards are allowed; (ANY CHAR f1);ANY SEQUENCE, for example, finds a string when given only its beginning and ending characters. SET SEARCH sets sensitivity to upper- and lowercase and sets up conditional groupings of characters to be look for. NOT causes the conditions that have been set for the search to reject a string from a search rather than include it. With combinations of these functions, the user can perform such tasks as looking for all three-character words that begin with t but do not have e, a, or t as their third letter.

WriteMaster includes several features which are provided as extra cost options on other word processors.

WriteMaster includes several features which are provided as extra cost options on other word processors. Merge, for example, allows the user to pick names from one file and insert them in a form letter contained in another file. *WriteMaster* is used to set up both the boilerplate and the data file. The merged stream may be displayed on the console, sent to the printer, or saved back on disk.

Another useful command for those who write books and long papers is the INDEX command and its companion MARK-FOR-INDEX. Used together, these two commands can build an alphabetized index with page number references. This index is appended to the user's file and can be edited just as normal text would be edited.

WriteMaster also has the best documentation in the package.

Summary

The C-10 is a mixed bag. I gathered the information for this review over three months, during which time I was given four releases of the operating system and two different C-10 computers. Why so many changes? Because I was getting all sorts of strange results from the system. Many times while using *WriteMaster* and *PlanMaster*, the system would hang, hit the System Trap, garble and display, destroy my file, or retrench to some lower level of code on the operating system.

I did observe steady improvement through the later releases of the software, but I cannot ignore this general instability in the system. I do not nor do the people with whom I have spoken at Cromemco know just how many of the problems I experienced are bugs in the software and how many are attributable to hardware failures. Certainly, the latter part of the review process, after the original system had been replaced, went much more smoothly than the first part.

As far as I am concerned, *WriteMaster* is almost reason enough to buy the machine. Structured Basic and the Screen utility offer the user who wants to write his own software enormous power. For these people, an assembler and additional languages are available as extra cost options.

It is a shame that *PlanMaster* falls so far short of the quality of the rest of the system. It is definitely the poorest program in the package.

The C-10 is also in desperate need of communications software, not only of the modem hookup variety but of the system-to-system-through-serial-interface-variety. I sat here for over two months with four other computers within arm's reach and several hundred floppy disks and tapes full of software but no way to get any of it into the C-10.

Conclusion

When I was a little tyke, one of my favorite stories was "The Little Engine That Could." I thought of it as I watched one of the high-resolution graphics demos on the C-10: a train was chugging its way across the screen with smoke pouring from its stack and the whistle blowing. It occurred to me that the C-10 is like that little train . . . if it could just throw off some of the dead weight and get up a little more steam, it could make it to the top.

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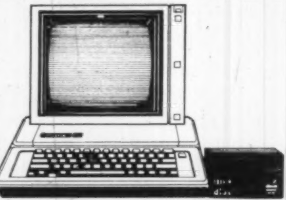

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VISTA	DiskPak V1200, 6MB Backup Sys	$1549	$1049

OVERSTOCK SPECIALS

WHILE THEY LAST

★ **Axlon**, 320K RAM Disk System (+ or e)	$1000	$650
★ **CCS**, Serial Interface 7710A (Set Baud)	$ 150	$ 99
★ **ComX**, 16K RAM Card, 1 Yr. Wty., for II+	$ 179	$ 39
Microsoft, 16K RAMCard for II+	$ 100	$ 69
★ **Silicon Valley**, Word Handler	$ 250	$ 39
List Handler	$ 90	$ 35
Videx, Videoterm, 80 column card for II+	$ 345	$229

RAM EXPANSION

★ **ComX** for IIe, 80 col. 64K Adder Card	$ 295	$145
★ **ComX**, RAM Card, 1 Yr. Wty. (II+) 16K	$ 179	$ 39
★ **ALS**, ADDRam (II+) 16K	$ 100	$ 59
★ **Microsoft**, RAMCard (II+) 16K	$ 100	$ 69
★ **Saturn Systems**, RAM Card (II+) 32K	$ 249	$169
RAM Card (II+) 64K	$ 425	$299
RAM Card (II+) 128K	$ 599	$399
★ **Axlon RAM Disk System** (+ or e) 320K	$1000	$650

VIDEO CARDS

★ **ALS**, Smarterm II (+ or e)	$ 179	$139
ComX, 80 col. 64K Adder (IIe)	$ 295	$145
Videx, Videoterm 80 col. (+ or e)	$ 345	$229
★ UltraTerm (+ or e)	$ 379	$279
Soft Video Switch (II+)	$ 35	$ 25
Enhancer II (II+)	$ 149	$ 99
Function Strip (II+)	$ 79	$ 59
We Have Full Videx Line.	Call.	Up to 35% off.
Vista, Vision 80	$ 289	$199

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ALS, The CP/M Card V3.0 (+ or e)	$ 399	$299
Z-Card (+ or e)	$ 169	$129
Color II (+ or e)	$ 179	$139
ASTAR, RF Modulator, to use TV	$ 35	$ 25
★ **CCS**, Serial Interface 7710A	$ 150	$ 99
Eastside, Wild Card (copier, + or e)	$ 140	$ 99
Wild Card Plus	$ 190	$139
Kensington, System Saver	$ 90	$ 65
Key Tronic, KB200 keyboard (II+)	$ 298	$219
★ **Koala**, Graphics Pad	$ 125	$ 85
Kraft, Joystick (Ap II II+)	$ 65	$ 49
Paddle (Ap II II+)	$ 50	$ 39
M&R, Sup R fan (+ or e)	$ 50	$ 39
★ **Microsoft**, Z80 Softcard (+ or e)	$ 345	$235
Z80 Softcard Plus (+ or e)	$ 645	$459
Softcard Premium Pack (II+)	$ 695	$495
Softcard Premium Pack (IIe)	$ 495	$395
Micro Tek, Dumpling 64, Buffer	$ 349	$269
★ **Orange Micro**, Grappler Plus (e or +)	$ 175	$119
16K Buffer Board for Grappler +	$ 175	$119
Buffered Grappler +, 16K	$ 245	$179
Paymar, Lower Case Chip (II+)	$ 50	$ 39
★ **PCPI**, Appli-Card, 14 features 6 Mhz	$ 375	$275
128K Memory Expand Board	$ 495	$395
RH Electronics, Super Fan II	$ 75	$ 59
★ **Saturn Systems**, Accelerator II	$ 599	$449
Transcend, SSM, AIOII, Serial Para I/F	$ 225	$169
TG Products, Game Paddles (II+)	$ 40	$ 29
Joystick (II+)	$ 60	$ 45

SOFTWARE for APPLE II+ /IIe

BUSINESS

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Artsci, MagicWindow II NEW!	$ 150	$ 99
Magic Combo (Wind, Mail & Words)	$ 225	$149
★ **Ashton-Tate**, dBase II (Req CP/M 80)	$ 700	$385
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Friday (Requires CP/M 80)	$ 295	$199
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Continental, GL, AR, AP or PR ea	$ 250	$165
Home Accountant	$ 75	$ 49
FCM	$ 100	$ 69
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Market Manager	$ 300	$235
Market Microscope	$ 700	$525
Fox & Geller, Quickcode (for dBase II)	$ 295	$185
dGraph (for dBase II)	$ 295	$185
dUtility (for dBase II)	$ 99	$ 66
Hayden, Pie Writer (Specify 80 col. board)	$ 150	$ 99
Howard Soft, Real Estate Analyzer II	$ 195	$129
Tax Preparer	$ 225	$149
LJK, Letter Perfect w Mail Merge	$ 150	$ 99
Micro Craft, (requires Z80 CP/M-Card)		
Verdict or Billkeeper	$ 995	$469
Micro Lab, Tax Manager	$ 180	$119
Micro Pro, (all require Z80-CP/M Card)		
★ WordStar w Applicard & CP/M SPECIAL	$ 495	$325
WordStar + Training Manual SPECIAL	$ 495	$239
MailMerge™ SPECIAL	$ 250	$129
SpellStar™ SPECIAL	$ 250	$129
★ WordStar Professional, 4 Pak SPECIAL	$ 895	$429
Microsoft, Multi-Plan (CP/M or Apple DOS)	$ 275	$175
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Budget, Multitool (CP/M or DOS)	$ 150	$115
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Perfect Writer Speller 2 Pak	$ 695	$199
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Lexicheck IIe (use w Juggler)	$ 149	$ 99
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★ List Handler	$ 90	$ 35
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(specify + or e) PFS: Report	$ 125	$ 84
PFS: Graph	$ 125	$ 84
Stoneware, DB Master Version 4.0	$ 350	$ 229
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Visicalc 3.3	$ 250	$ 169
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for the ATARI

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10 each, SS, SD, 35T (Apple, Atari)	$ 45	$ 18
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NOVATION, All below require RS-232		
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D-Cat	$ 199	$ 159
J-Cat	$ 149	$ 104
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Smart Cat 103/212	$ 595	$ 415
SSM, Transcend 1 for Apple II Data Comm.	$ 89	$ 69
ModemCard for the Apple II	$ 299	$ 259
Transmodem 1200 (110/300/1200)	$ 695	$ 559

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★ **AMDEK**, 12" Green, #300G	$ 200	$ 135
★ 12" Amber, #300A	$ 210	$ 149
★ 12" Amber, 310A for IBM-PC	$ 230	$ 159
★ 13" Color I, Composite	$ 379	$ 289
★ 13" Color II, RGB, Hi Res	$ 529	$ 439
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FX100, CPS		Call
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OKIDATA, 82A, 80 col., 120 cps, Para.	$ 549	$ 448
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PRACTICAL, Microbuffer In-Line 64K, Para.	$ 349	$ 259
Microbuffer In-Line 64K Serial	$ 349	$ 259
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Quad 512 +, 256K plus serial port	$ 550	$ 420
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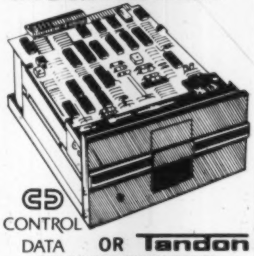

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BUSINESS

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A Detachable Replacement Keyboard for Atari

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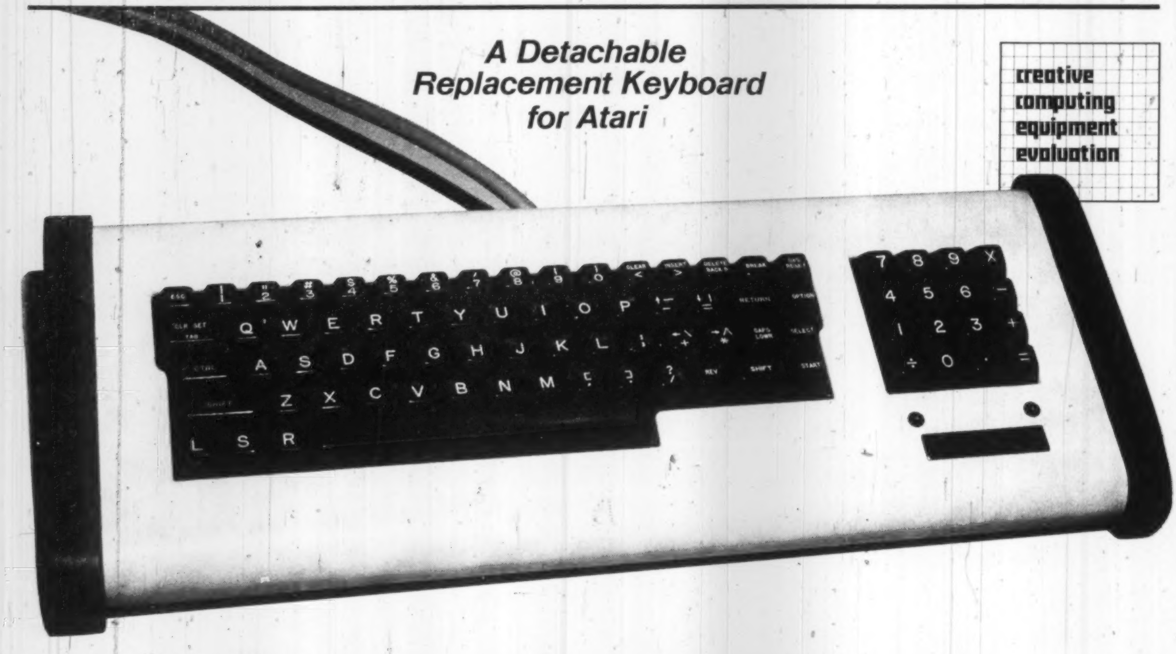

Commander Keyboard

Arthur Leyenberger

It has been over four years since the Atari 400/800 computers made their debut on the home computer scene. At first, there was very little software. A few games and a couple of educational packages was about the extent of it. Those who had foresight recognized that the Atari computers were state-of-the-art machines and began supplying software.

Additional software became available. More games, application software like word processors, database programs, and even a spreadsheet appeared. Suddenly, about two years ago the flood gates burst open and a wealth of software arrived for the Atari machines. Now, over a thousand programs are available which means that the Atari user can choose from as much software as just about any other computer owner.

The hardware story is a little bit different. At first, Atari was very tight-lipped about their machines. In fact, most people were unaware of either the components that made up their home computer or the power that lay beneath the keyboard. Then, hardware modifications gradually became available. An 80-column board, a voice synthesizer, and even a couple of keyboards to replace the membrane keyboard on the 400 were made. This growth in aftermarket hardware products was spurred on by Atari themselves, who by then, published the specifications and schematics for the computers in the form of a hardware manual.

Amid the recent avalanche of alternate operating systems, resident monitors, and memory cards comes a new product manufactured by Ralston-Clearwaters Electronics, the Commander keyboard.

RCE actually makes three keyboard products for the Atari 400 and 800 computers. Called the Commander series, a detachable keyboard (#2400-2), a detachable keyboard with keypad (#2400-1), and a separate keypad (#2400-5) are available. The Model #2400-1 is a full-stroke, full size keyboard containing the Atari special function keys, special macro keys, and a numeric keypad on the right side. A host of additional features have also been incorporated into this deluxe hardware addition to the Atari computer. Before I describe them, let me discuss the way the keyboard is installed.

I am not a hard core hardware person. Sure, I have built a few Heathkits in my time, learned digital electronics on my own by experimentation, and am pretty fast with a soldering iron. But I have a general rule that I always try to follow: if it works, don't fix it. So it was with trepidation that I dared to open my Atari 800 and install the RCE keyboard interface. As it turned out, my fears were unfounded. I am using the keyboard now to type this review and all is well.

Installation

The first step in installing the Commander keyboard was to read the five pages of instructions to familiarize myself with the procedure. The instructions looked simple enough. All I had to do was follow along step-by-step and refer to the easy to read diagram.

First, I placed the computer upside down with the keyboard side toward me and removed the five screws holding the bottom cover on. Next, the speaker was detached and placed out of the way.

creative computing

HARDWARE PROFILE

Name: RCE Model #2400-1
Type: Detachable keyboard
System: Atari 400/800
Summary: A quality separate keyboard with many features.
Price: $199.95
Manufacturer:
Ralston-Clearwaters Electronics
530 N. E. E St.
Grants Pass, OR 97526

Arthur Leyenberger, c/o Creative Computing, 39 E. Hanover Ave., Morris Plains, NJ 07950.

Three more screws, which hold the top half of the cover on, were removed to complete the disassembly.

Removing the top cover exposed the mother and power boards containing the ribbon cables coming from the existing keyboard. The interface consists of two sets of gold-pin connector plugs that are attached to the existing keyboard jacks; two insulated alligator clips are attached to both sides of a capacitor.

The Commander keyboard provides many useful features at a reasonable price.

The cover was placed back on the computer and the flat ribbon cable was routed to the side and sandwiched between the 800 keyboard and its associated cable. The speaker was reattached, and the bottom cover fastened with the screws. That completed the installation and I was ready to try out the new keyboard.

A total time of 47 minutes had elapsed from the time I first began to unscrew the bottom cover of the 800.

Operation

The detachable keyboard has a six-foot cable terminating in a male plug. Sticking out of the left side of my 800 is a female jack. I chose not to install the female jack permanently; therefore, it simply dangles from between the top and bottom halves of the computer cover. Connecting the jack and plug, turning on the power to the computer and loading a Basic program revealed that all was in perfect working order.

There are several useful features on the Commander 2400. At the lower left corner of the keyboard, are three keys labelled L, S and R. These are macro function keys and represent three separate functions—list, stop/start, and run. With a Basic program in memory, pressing the L key lists the program on the screen. It is equivalent to typing L. or LIST. In fact pressing this key actually sends those characters to the computer.

The S key is equivalent to pressing CTRL-1. If you are listing a Basic program, this freezes the listing on the screen. Pressing the key one more time resumes the listing at the point at which it stopped. The S key also temporarily suspends the execution of a Basic program or a directory listing when in DOS.

The R key is a macro for the RUN command. Pressing R runs a Basic program that is currently in memory. It is equivalent to typing R-U-N and pressing RETURN.

In addition to having the separate numeric keypad, which is handy for entering data, a built-in calculator is also provided. There is a slide switch underneath the keyboard which enables the calculator function. When switched on, a green LED is lit and calculations may be performed without disturbing your program. Pressing the second = key activates and initializes the keypad.

This calculator mode places a PRINT statement before the next entry so all you have to do is type in your calculation and press =. The answer is immediately displayed on the screen—a nice touch.

Comment

I have a few minor comments about the Commander keyboard. The cable that comes out of the keyboard is quite thick. When I attached the cable plug to the female jack that dangles just outside of the computer, I noticed that it put some stress on the ribbon cable. If I were to have this keyboard permanently installed, I would certainly mount the female jack on the side of the computer. The instructions provide details for doing this.

I do a lot of word processing on the Atari computer and have grown accustomed to the placement of the keys. Although I am not a touch typist I feel for the right edge of the keyboard to find the RETURN, DELETE, CAPS, and cursor control keys. On the Commander keyboard, the START, SELECT, OPTION, and SYSTEM RESET keys are not separated from the main cluster of keys. Also they are the same size as the other keys. Hitting the special function keys while typing has not caused any problems because the word processor I use does not recognize those key presses. Accidently pressing reset while programming, for example, may have more serious consequences.

Overall, the Commander Model #2400-1 is an excellent detachable keyboard. It is easy to install, provides many useful features and is reasonably priced. The tactile feedback of the keys is stiffer than that of either of my two Atari 800s. In just the short time I have been using the Commander, I have become used to it and now prefer its feel. I think the numeric keypad is great. It really makes typing numbers much easier, and for those who can enter data via a keypad without looking, there is a raised dot on the 5 key for centering your fingers.

There is one missing feature on the Commander that I would have liked to see implemented. That is to reverse the function of the cursor control and arithmetic keys. Instead of having to press and hold the CTRL key with any of the cursor keys, the cursor keys would be one-press keys. The arithmetic keys would then require the use of the CTRL key. This arrangement makes sense given that the cursor keys are used much more often than the arithmetic keys.

Is the Commander #2400-1 worth the cost and time required to install it? I believe it is. Although the addition of a detachable keyboard to the Atari computer is really a professional touch that may not be required by everyone. If you do a great deal of typing or entering data, you should definitely consider this quality product.

WELCOME TO
BASIC TRAINING
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"Let's get one thing straight right off. I'm the programmer, you're the programmee."

Adding CP/M and extra speed to your Apple

creative computing equipment evaluation

The PCPI Appli-Card

Loftus E. Becker

Microsoft has lost its monopoly on CP/M cards for the Apple. At least half a dozen manufacturers now offer Z80 cards for Apples; most are considerably cheaper (albeit generally with far less software and documentation) than Microsoft's Z80 card. Moreover, the new generation of fast Z80 chips, running at 4 and 6 MHz—two or three times the speed of Microsoft's—has spawned several new cards.

One of the available alternatives to the Microsoft card for all forms of the Apple II is the Appli-Card from PCPI, Personal Computer Peripherals, Inc. The Appli-Card is available in 4MHz and 6MHz versions; the 6 MHz Appli-Card is the subject of this review. As compared with other CP/M cards, it has several features of special interest in addition to its high processing speed.

Features

The Appli-Card is effectively a whole computer on a plug-in card. It contains not only the microprocessor, but also 64K of RAM used for CP/M and the running program. The 64K of Apple memory is used only for drivers controlling input and output. The net effect of this is that the available memory for CP/M programs is about 57K—somewhat more than is available to users of the Microsoft card. No use is made of the additional 64K of memory on the Apple IIe extended 80-column card.

The Appli-Card has been configured to accept additional plug-on boards. At the moment, the only such board available is a RAM extension, which can be configured for 64K or 128K of additional memory. The RAM extension can be used as a RAM disk under CP/M, giving either 64K or 128K of phantom disk space. Since some of this space is used for the directory, the usable space for programs or data is slightly less—about 110K on the 128K board. In addition, software is provided by PCPI to use both the 64K on the Appli-Card and any additional RAM as a pseudo-disk under DOS.

Finally, the Appli-Card provides several interesting options for screen display. Users who lack an 80-column card can choose between a scrolling display of up to 255 columns per line and a 70-column display created using the high-resolution graphics page. (Since the Appli-Card does not use Apple RAM except for I/O drivers, there is no loss of program space when this option is chosen.) Hence it can be operated quite usefully in CP/M for applications such as word processing without buying an 80-column card for display.

> ***Installation is not difficult; nor is it well explained in the manual.***

The Appli-Card comes packaged with four disks, two of which are superseded versions, provided as "backups" to the useful ones: a brief 28-page manual; a copy of Murtha and Waite's excellent *CP/M Primer*; and, thoughtfully for Apple II owners, a useful kit for easy installation of the SHIFT-key modification. The disks are not copy-protected.

Installation

Installation is not difficult; nor is it well explained in the manual. You must, of course, plug in the card. In addition, however, you must determine which of many options (mostly regarding video display) to choose for the installed system. This requires first running a program to configure SFTVIDEO, the driver that runs the console output, and then running a second program, INSTALL, to patch CP/M for the drivers chosen and create a file containing those drivers for loading at boot time.

Both programs are menu-driven, a real blessing since the documentation is quite fuzzy on these points, and leaves many of the available options unexplained. In any event, however, you can always keep rerunning the program until you obtain satisfactory results. If you dislike experimentation, you should purchase the card from a dealer who will hold your hand through the installation process.

Supplied Programs

In addition to the programs provided for installation, the Appli-Card comes with nine standard Digital Research utilities: ASM (the 8080 Assembler); LOAD (used with the assembler to create executable programs); DDT (a very useful debugger and monitor); DUMP (which displays a disk file in binary form); ED (a primitive, line-oriented text editor); PIP (a general-purpose file transfer program); STAT (a utility to display and change disk and system information); and SUBMIT and XSUB (used with text files in a manner similar to Applesoft EXEC files).

All of these utilities except DUMP are documented in the Murtha and Waite *Primer*. This program needs little documentation (DUMP A:NAME.EXT will show A:NAME.EXT, in hex on the screen), but that nothing is said about it is some indication of the hasty manner in which the current documentation was apparently compiled.

Finally, PCPI provides two (four if you have purchased the RAM extender)

Loftus E. Becker, Jr., 3110 N St., N.W., Washington, D.C. 20007.

additional and necessary programs. COPYFRMT substitutes for the COPY and FORMAT programs familiar to Microsoft mavens; it allows copying and formatting of disks. COPYFRMT is a bit slower than the Microsoft version, but also more user-friendly. It is slower because it displays more information while operating and does more verification of the copied or formatted disk.

ADOSXFER transfers files (text, Applesoft, Integer, or binary) between DOS and CP/M disk formats. DOSRDSK allows use of the Appli-Card and extra RAM as a RAM disk under DOS (128K or 192K). And ERADIR is a program necessary for use of the extra memory as a RAM disk under CP/M.

Compatibility

Compatibility is a serious problem on nonstandard high-performance Apple accessories. With the Appli-Card, compatibility problems arise with both software and hardware. As far as software is concerned, PCPI claims that all "generic" CP/M programs—that is, programs not written with the Apple and Microsoft card specifically in mind—will run with the Appli-Card, and I have no reason to doubt this. Certainly all the ones I have tried—public domain and commercial programs—have run without a flaw.

Compatibility is a serious problem on nonstandard, high-performance Apple accessories.

However, that is not the end of the matter. PCPI says (on the phone, but nowhere in their advertising or documentation) that very few of Microsoft's programs will work with the Appli-Card. The only ones I own are MBasic and GBasic, and it is certainly true that they will not run properly with the Appli-Card.

PCPI claims that this is because the programs regularly check for the presence of a Microsoft card and hang if the card is not present. Perhaps, but I question this explanation. MBasic works perfectly on my machine *except* when one of the cursor movement commands (HOME, VTAB, HTAB) is called; GBasic also bombs with graphic commands. My own suspicion is that the reason for the failure is that both programs use the Apple monitor built-in subroutines for cursor (and graphics) control: Microsoft CP/M even comes with a specific explanation of how 6502 subroutines can be called from Z80 assembly language programs. Although PCPI provides nothing in its documentation to answer the question one way or another, I suspect that PCPI's CP/M either does not support this (occasionally useful) feature or implements it in a different manner.

If I am correct in this supposition, two conclusions follow. First, it should be possible for PCPI to develop patches to allow MBasic and GBasic to run with their card. And second, that *any* Apple-specific programs that rely on calls to 6502 subroutines as implemented under Microsoft CP/M will similarly bomb.

The final compatibility problem relates to hardware. Microsoft has been the standard for so long that manufacturers (of, for example, nonstandard, high-capacity disk drives) routinely refer to drives as "CP/M compatible" when they are compatible only with Microsoft CP/M. Whether a particular peripheral will also be compatible with the Appli-Card is always a question.

In general, unless the peripheral manufacturer provides specific support for the Appli-Card, it will not be. Vista (at a small extra charge) supports the Appli-Card for its V1200 drive and presumably for its other high-capacity drives as well. Since many CP/M programs require large quantities of disk space, CP/M users quite often add high-capacity drives, so you should investigate this question thoroughly before investing in an expensive disk drive.

The compatibility problem is not insoluble. Indeed, the Appli-Card, since it can be installed with many complicated drivers, is well-adapted to conform with disparate equipment. However, on this matter in particular, PCPI's documentation is woefully inadequate. Additional information is available from PCPI at a $45 charge and at PCPI's discretion; whether the additional information provided would be sufficient for the technically-oriented user to make the required patches I do not know. Almost certainly the nontechnical user could not.

Operation

If compatibility problems are overcome (and I should emphasize that many or most users will never encounter compatibility problems) one can *almost* forget about the card and simply go about the business of running whatever CP/M programs you choose. The "almost" in the previous sentence refers to one aspect of operation. When CP/M is first booted, a file called DRIVERS must be on the boot disk. This file will vary in length depending on the drivers loaded; on my system it is about 8K. What this means is that you must reserve the extra space (in addition to the boot tracks) on the disks from which you plan to boot the system. If you are content always to boot from one master disk and then switch to whatever program disk you use, this presents no problem at all. The DRIVERS file need not be the disk for a warm boot.

Once up and running, the card functions admirably. How much you will notice the increase in speed depends to some extent on the programs you run. Of those that I have tried, word processing programs, in particular, benefit from the quicker operation. The notoriously slow print-spooling operation of *WordStar* is speeded up sufficiently that editing while printing is quite tolerable. Formatting and printing operations in *Final Word* are now quite fast, and I have yet to lose even a character during print spooling. *dBase II* benefits substantially in some operations, such as sorting or indexing, but not noticeably in others. MBasic computational programs that formerly ran slower than Applesoft equivalents now run substantially faster.

Word processing programs benefit from the quicker operation.

The RAM Extender

The optional RAM Extender functions as a RAM disk drive with software provided for CP/M and DOS. (Hopefully, if and when PCPI provides CP/M 3.0 for the Appli-Card, it will be useful for this as well.)

Under CP/M, the RAM disk functions perfectly and is an enormous boon for programs that require a great deal of disk access. The 64K version is useful for some things, but the 128K version is more than twice as good, since an entire disk can be dumped to the pseudo-drive. The software functions perfectly with my Vista V1200.

Under DOS, the RAM disk is less useful: it works quite well, but I have several reservations. First, installing the software lowers HIMEM by about 700 bytes. The documentation never mentions this; and the consequence is that programs which expect HIMEM to be in a particular location may bomb. *Screenwriter II*, for example, will not work with the RAM disk.

PCPI is reported to be testing a revised version of the software that will disable the INIT command but not alter HIMEM. This is a mixed blessing, since such a modified DOS would make it incompatible with most high-capacity disk drives. If both versions are made available, however, the user would have a useful choice.

In any event, the speedup under DOS is not as dramatic as one might hope. Although BLOAD, BRUN, CATALOG, and RUN are, indeed, speeded up dramatically, text file manipulations are less impressive. A program to write 1000 38-character records to a text file took about two minutes to run with the RAM disk and normal Apple DOS. The same program ran in only 50 seconds with Diversi-DOS and a real disk drive. Interestingly, the RAM disk is apparently compatible with Diversi-DOS; using both, the program ran in only 25 seconds.

Conclusion

The PCPI Appli-Card is an excellent product. The technically-oriented user will find the documentation poor by any standard, and awful when compared with that provided by Microsoft. The nontechnical user, however, may find the lack of specifics and detail more than outweighed by PCPI's inclusion of the excellent Murtha and Waite *CP/M Primer* at no extra charge.

Apple owners who do not have 80-column cards will find that the Appli-Card gives them a quite acceptable 70-column display. The RAM Extender is extremely useful in CP/M; if you are willing to put up with a short delay at the outset, a diskful of programs can be dumped to the RAM disk and operation of heavily overlaid programs (which includes most commercial CP/M programs with which I am familiar) speeded immensely.

The problem is the incompatibility with Microsoft Basic and GBasic.

The most serious problem with the card is its incompatibility with Microsoft Basic and GBasic. Owners of Microsoft cards who have an extensive library of programs in these languages will find the graphics programs unusable, and will have to purchase another Basic (and probably rewrite at least some of the programs) to get even nongraphic programs to run properly. If this is important to you, the cost of the additional Basic ($100 or more) must be factored into the equation. (PCPI does say that if you can get a copy of Microsoft's "plain Vanilla" Basic as supplied on 8" disks and download it to your computer, it will run properly.) And if graphic capabilities in a CP/M Basic are critical, you may have to eliminate this card from consideration.

Customer support appears decent. My one call was not taken immediately but was returned by PCPI (a long-distance call at their expense) quite promptly. As mentioned above, I am a bit dubious about the accuracy of the explanation they provided but they were quite open about the fact that Microsoft Apple Basic and GBasic would not run.

The Appli-Card presently lists at $375. It is also available, bundled with *WordStar* for $500 list—good value if *WordStar* is the word processing program you want. The RAM Extender is another $200 or so, depending on whether you get the 64K or 128K version. The 64K version is said to be upgradable to 128K by the addition of eight 150ns 4164 chips, at a cost of about $50.

PCPI, 16776 Bernardo Center Dr., San Diego, CA 92128. (619) 485-8411. END

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Multi-Function Back for Minolta X-700 Camera

Stephen B. Gray

Minolta's top of the line single-lens reflex camera is the X-700, a "state-of-the-art quartz-control electronic 35mm SLR," as the product guide calls it. It is one of the new breed of 35mm cameras that are almost idiot-proof; you load it, set the film speed, then simply focus and shoot.

The X-700 offers Programmed Automatic Exposure, which "requires absolutely no manual setting of aperture or shutter speed . . . The X-700 program mode automatically selects aperture and shutter speed for proper exposure, maintaining the fastest practicable speed as light dims, giving visible indication and audible beeps, if desired, to guard against blur from subject/camera movement." The X-700 is said to be the first shutter-weighted system: it is programmed to favor faster speeds in low light.

The X-700 is one of the new breed of 35mm cameras that are almost idiot-proof.

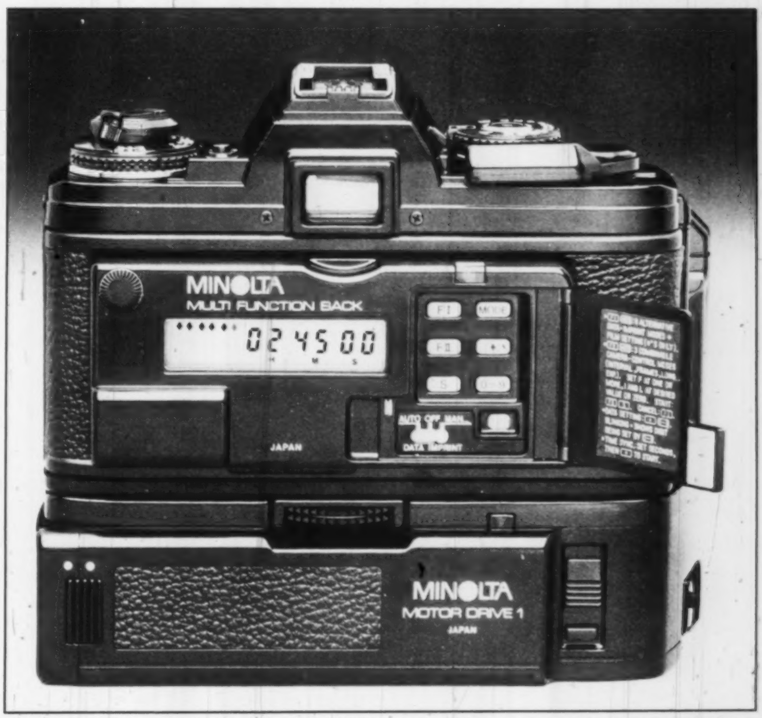


Figure 1. The rear of this Minolta X-700 camera shows two accessories attached: a motor drive and the Multi-Function Back. The control panel cover is open to show the operating keys.

For those who wish to exercise some control, the X-700 has two other modes. In Aperture-Priority Auto Exposure mode, you select the lens opening, and the camera selects a shutter speed for proper exposure, allowing you to control the depth of field.

In Metered Manual mode, you set the shutter speed and adjust the aperture until the LED next to that speed (in the viewfinder) lights up.

Automatic features of this type are usually based on integrated circuits. However, one of the accessories for the X-700 is the Multi-Function Back, which Minolta calls "the world's first microcomputer-controlled back to offer three camera-control modes for time-lapse, timed long-exposure, and multi-frame sequence photography, plus six data-imprint modes for indentifying or classifying photographs."

Other X-700 accessories include a motor drive, wireless controller, two flash units, and a Power Grip power source (which has a handle and mounts a flash unit on a swivel for "bouncing" the light).

Multi-Function Back

The Multi-Function Back (Figure 1), easily installed in place of the standard back, protrudes only about a quarter of an inch more than the original back. Yet it performs a variety of functions that weren't available before or required much more hardware than could be attached directly to the camera.

Minolta X-700, continued...

The back consists of a six-character liquid crystal display, a control panel with half a dozen keys, control panel cover, and battery chamber, plus a microprocessor, quartz clock, and an automatic calendar that keeps track of dates up to the year 2099. Once set, the date automatically changes, with leap years and varying number of days in a month all taken care of.

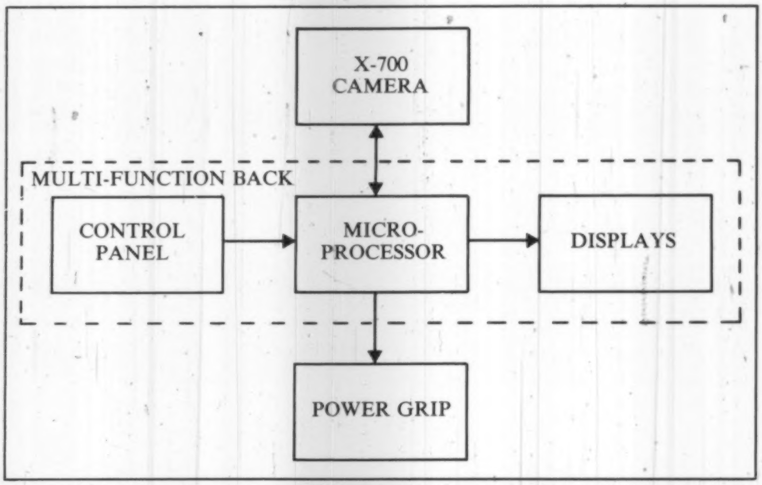


Figure 2. This unofficial block diagram of the Minolta X-700 Multi-Function Back shows how simple the accessory is, yet it operates in nine different control and imprint modes.

Block Diagram

The unofficial block diagram (Figure 2) was drawn during a discussion with a Minolta manager. It is quite simple: the control panel operates the microprocessor, which controls the camera and the display and also sends signals to the Power Grip when flash is required in interval mode.

Camera Control Modes

Press the FII key on the back, then the MODE key, and you are ready to set one of the three camera-control modes. These modes can be used alone or in combination to control the shutter of the X-700.

You can set the camera to take a picture every three seconds, or every two hours, or every 33 hours, for example. You can set the X-700 to take one picture at each of those times, or several dozen. You can also control how long the shutter stays open.

Using all three modes together, you could set the X-700 to take three frames every four hours, with the shutter open two seconds for each shot. It does all this automatically, without your having to be there.

Interval Mode

The time set in Interval mode determines how long the camera waits between exposures. This mode usually requires using a motor drive or the slower auto winder, although the film can be advanced by hand if the interval is long enough.

Put the X-700 on a tripod, and in Interval mode you can photograph a scene such as traffic patterns, cloud movement or a flower coming into bloom automatically every few minutes, from dawn to dusk. (Figure 3.)

Interval can also be used with flash. The flash turns on, warms up, fires at the precise moment, and shuts off, and the film automatically winds to the next frame. This can be used to photograph plants and animals at night, for example.

The interval can be set for any time between one second and 99 hours, 59 minutes, 59 seconds, the limit of the LCD display.

The interval is set on the LCD display much as you would a digital watch.

Frames Mode

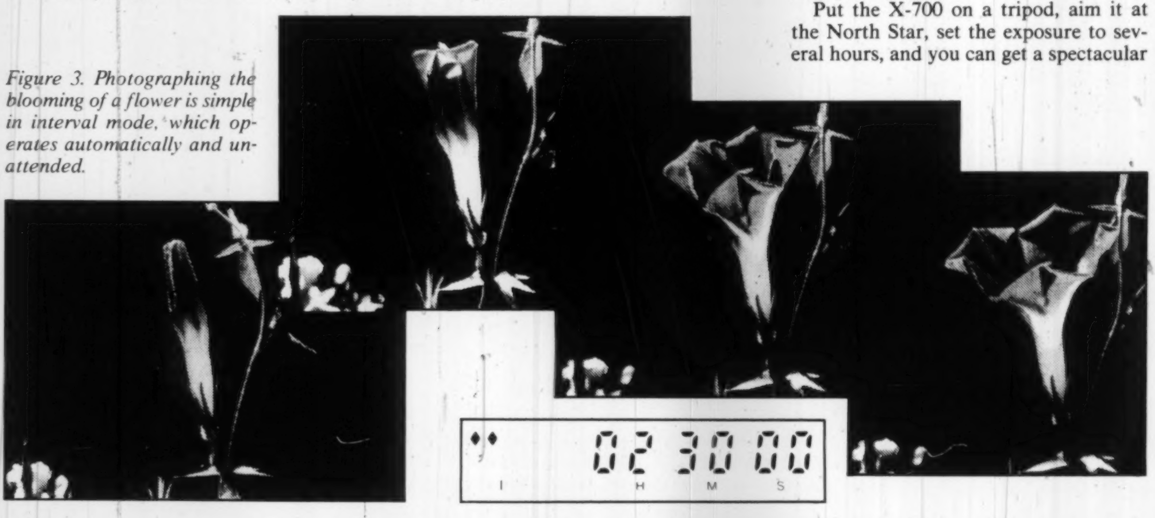
The number set when the Multi-Function Back is in Frames mode determines how many photographs are taken at the interval you set. The number of frames you can set is theoretically the limit of the display—999,999.

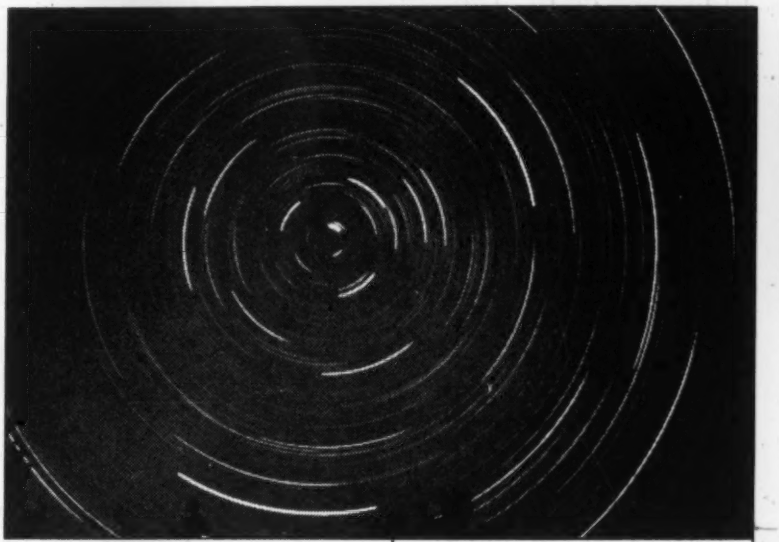
Long Exposure Mode

The Long Exposure mode controls how long the shutter stays open to take the photograph. The range is from one second to a maximum of three or six hours, depending on the type of batteries used, and how fresh they are. This mode is used mostly for night scenes or astrophotography.

Put the X-700 on a tripod, aim it at the North Star, set the exposure to several hours, and you can get a spectacular

Figure 3. Photographing the blooming of a flower is simple in interval mode, which operates automatically and unattended.





♦♦
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Figure 4. Using a long-exposure time of several hours, spectacular effects can be achieved with sky photographs.

photo showing dozens of concentric rings, as the sphere of stars seemingly circles around the earth's axis. (Figure 4.)

Data-Imprinting Modes

Less interesting photographically than camera-control functions, but just as valuable to those who need them, are the data-imprinting modes. In these six modes, numbers are imprinted in the lower right corner of the film for identifying or classifying the photographs.

The LCD display on the back of the Multi-Function Back is duplicated by a small group of light emitting diodes (LEDs) on the inner side. The LEDs also form six figures in three pairs, but they are only about 3.5 mm high.

These LEDs are mounted in the film pressure plate, and are thus pressed against the film. When turned on in different combinations, they imprint data directly onto the film.

You can imprint the time or date of exposure. You can imprint one number or consecutive numbers, starting at zero or anywhere else.

Imprinting and camera-control functions can be used simultaneously.

Time

Recording the time a photograph is taken can be important in legal and scientific work, and in sports. Thus, you can pinpoint the precise moment a volcano erupts, a space rocket lifts off, or a runner crosses the finish line.

First you set the quartz clock in the Multi-Function Back, which operates in 24-hour time, as in 19 33 42. With the DATA IMPRINT switch set to AUTO, the film will record the time of each shot. When the switch is set to MAN, you can push the blank button at the lower right of the control panel to imprint the time data at any time before, during, or after exposure. If you don't want to imprint the time on a particular frame, just set the switch to OFF.

Date

In Date mode, you have three choices for recording the information. You can set the display and data-imprinter to record the date as year, month, and day (83 12 25). Or month, day, year (12 25 83). Or day, month, year (25 12 83).

Date mode keeps track of special occasions, such as recording a child's growth, or important events such as birthdays, vacations, weddings, graduations, and so on.

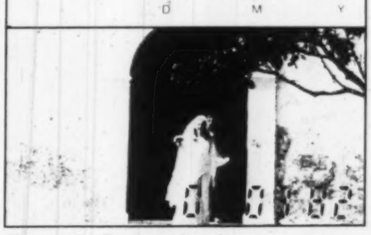

Figure 5. Putting the date on pictures helps keep track of special occasions.

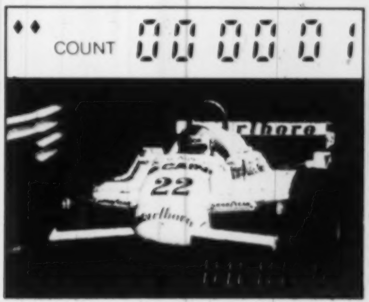

Figure 6. The Count mode can help a sports photographer record the order of finish in a car race.

Number and Count

In Number mode you can imprint any desired number from 00 00 00 to 99 99 99 on every frame. Or in Count mode you can number the frames consecutively, starting with 00 00 01 or anywhere else.

Using Number mode, you can encode photos with any number up to 999,999, according to your individual filing system.

Count mode is very useful for numbering in sequence the order of finish in a marathon or an auto race, for example.

Film Setting

Minolta's engineers took a small but important item into account when designing the LED data-imprinter. Some films are more sensitive to LEDs than others; for these films the LEDs should not be lighted as long as for the others. So you press the FI key, then the MODE key until only diamonds appear in the LCD display. Next press the diamond key until the correct number of diamonds appears; several dozen films have been categorized by their sensitivity to LEDs, and their settings (by number of diamonds) are given in the owner's manual. For Kodachrome 25/40, for example, you should light four LCD diamonds.

Added Details

Several nice little extra details help make the Multi-Function Back as user-friendly as possible. An LED above the control panel flashes every time data are imprinted on film, so you will know whether the DATA IMPRINT switch is set to AUTO or not. The LCD panel blinks every two seconds when the batteries are low.

Prices

The Minolta X-700 camera is available in New York camera stores for $230 or less and the Multi-Function Back at $179 or less.

Good Words

Four New Word Processors For The Apple

Stephen Arrants

It seems that there are more word processors for the Apple than for any other machine. It is a crowded field. Hardly a day goes by that a new software announcement does not cross my desk. I have to admit, I sometimes got a small thrill out of testing each one. It is like a game. How much further can an author push the Apple? What new tricks can he squeeze out of the 6502?

Word Juggler IIe lets you edit in 80 columns, but you can display on screen in more than 80 columns.

Friends are used to this by now. I am forever raving about some new word processor, comparing it to my standard, *Apple Writer.* Forget the games! Give me a good, solid word processor! I think my friend Ted said it best. I was talking up *Word Juggler IIe,* rambling on and on, when he said "OK, fine. But tell us, Steve—What's your highest score on *Screen Writer II?*" Sometimes I think PC users have no sense of humor.

To get this madness out of my system for a while, I recently tested four new word processors for the Apple. One is specifically for the IIe, one was a hit when it was shown to a third grade class, one is more than just a word processor, and the fourth is good, but perplexing.

Word Juggler IIe

Word Juggler started its life as a word processor for the much maligned Apple III. (See our review in the June 1983 *Creative Computing.*) Apparently, the people at Quark were not going to adapt it for the Apple II. Apple was going to have to adapt the machine to the software!

If you have ever worked on a dedicated word processor, you know how smooth and easy operation can be. There are not complicated control codes to memorize, no finger-twisting keystrokes. Each command has its own key. Now, Quark can't give you a new keyboard for the Apple. Instead, they supply replacement keycaps for the IIe keyboard. The keys look just like the normal Apple keys with one important difference. Printed on the front of the new keys are the special *Word Juggler IIe* commands. That's good.

One problem with using a word processor is memorizing a long list of commands. Does CONTROL-C mean Catalog or Change Case? Is CONTROL-S a Search command or a Save command? With the new *Word Juggler IIe* keys, you can almost forget the commands before you learn them. Not only are the command keys labeled, but they are logically grouped, not placed all over the keyboard.

Formatting Text

Formatting text is simple. A plastic template placed over the top row of keys lists printing options and how to generate them. Hit ESC and the proper key, and you have control over spacing, justification, pitch, and other printing commands. It is then inserted at the current cursor location and shown in inverse to distinguish it from text.

Information from DIF files can be inserted; variables can be used for form letters and can be defined within a document and made conditional.

One difficult part of using *Apple-Writer* is using WPL to spool files together for printing. *Word Juggler IIe* lets you insert document names into a text file in such a way that it automatically retrieves the named file and prints it out. No WPL to struggle with, and no limit on the number of spooled files that other word processors hit you with.

Printing

Suppose you want to print in 80 columns. Many word processors will format the screen this way, showing you how the text will look on paper. What if you want to print in 132 columns? Unfortunately, other word processors aren't set up to allow this display. You end up with word wrap and must guess at how the printout will look. *Word Juggler IIe* lets you edit in 80 columns, but you can display on screen in more than 80 columns. What you do is scroll left and right, moving the entire text. It is like having the left or right part of text off screen, but available.

Word Juggler IIe is written to operate under ProDOS, Apple's new operating system. ProDOS is compatible with the Apple III SOS, giving access to the ProFile hard disk drive. You can also access files written under SOS. If you need a word processor that can handle large files, must be easy to learn, and be in constant use. *Word Juggler IIe* is an excellent choice. Coupled with Quark's *Lexicheck IIe,* this is a full-fledged, fully configured system.

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SOFTWARE PROFILE

Name: Word Juggler IIe
Type: Word processor
System: Apple IIe
Format: Disk
Language: Machine
Summary: Easy to learn, able to handle large files.
Price: $239
Manufacturer:
Quark Software
2525 W. Evans Ave. #220
Denver, CO 80219

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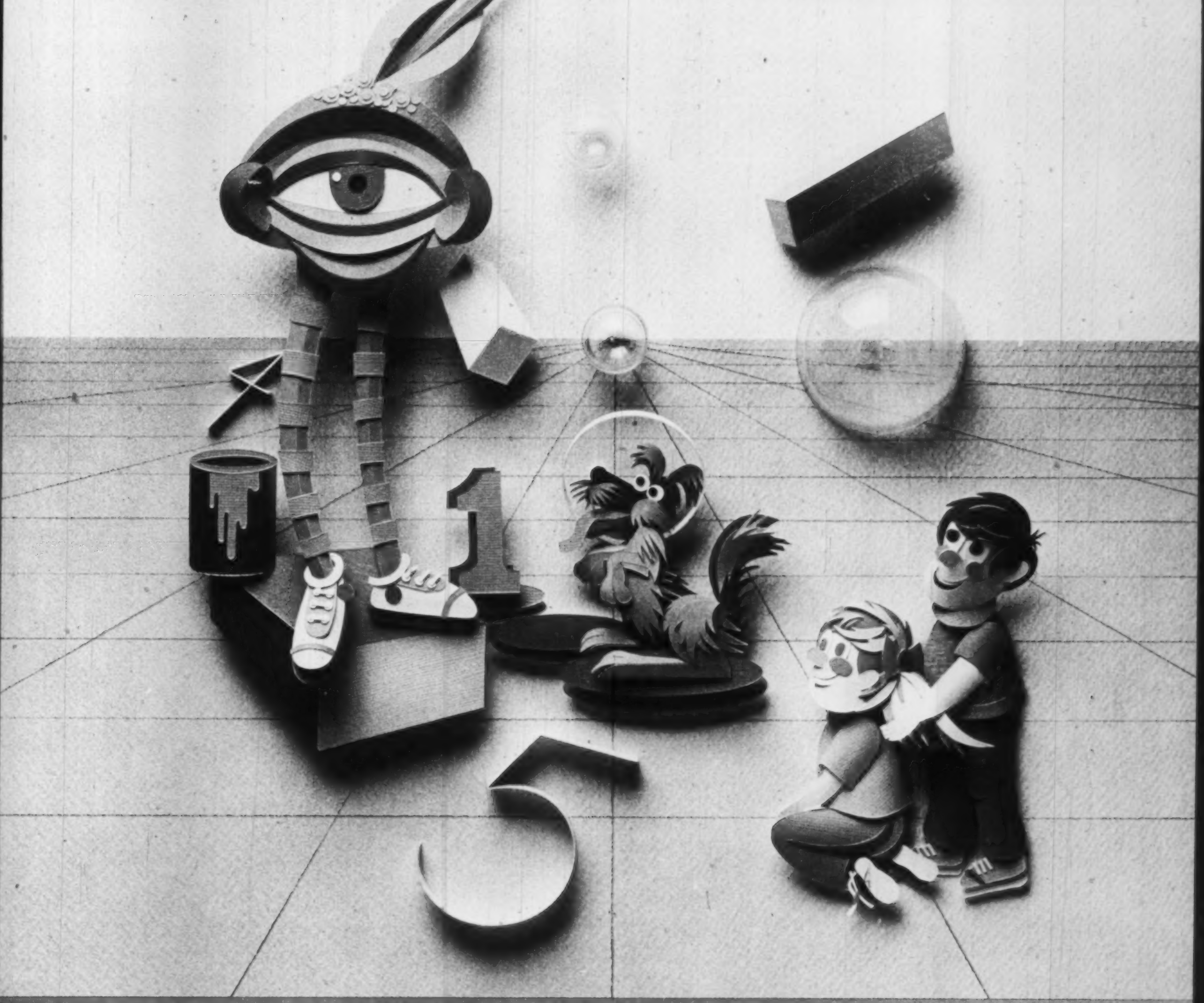

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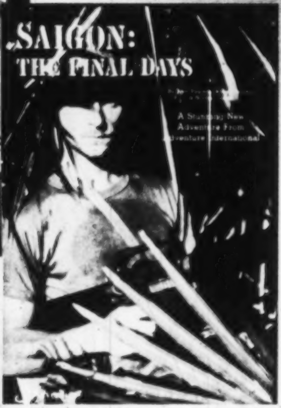
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Write Away

From a small, relatively unknown company comes a word processor that is extremely powerful and easy to learn. *Write Away* is a good choice for a word processor to grow into.

What can it do? Quite a lot! Five tutorials ease you into the difficult aspects of word processing. You can manage a mailing list, read and use DIF files, use macros (or "glossary" terms) by defining a key sequence to represent a word or phrase, and much more. For example, say you use the phrase "Apple IIe" throughout a document. Define the A key as the macro, and it is saved in a special buffer to be recalled when needed. A-ESC ESC will then retrieve the macro and insert it into the text.

You can tab through the text by letter, word, paragraph, or page. Search and replace is a standard feature in many word processors. However, *Write Away* also makes use of logical operators, which insert certain text depending upon which criterion is met. Logical operators are analogous to IF . . . THEN . . . ELSE statements in programming. If you are writing a form letter, you can program *Write Away* to find a person's title—Mr., Mrs., Miss, or Ms. Depending on which is found, you can then have *Write Away* change all gender references in the text. I can't think of *any* other word processor that offers this feature.

Two Modules

Write Away consists of two modules, the word processor and the print drivers. With an 80-column extended memory card, both modules are loaded. Without it, the Apple must switch between them. But because *Write Away* contains The DOS Enhancer, disk access is very fast. I clocked *Write Away* at about one-fourth to one-third faster than *AppleWriter.*

There are five printer drivers provided. One each for the Anderson-Jacobson 831/832; the Centronics 737; the Diablo, NEC, and Qume printers; the Epson MX-80 with Graftrax; and the Epson MX-80/100 with Graftrax Plus. There are instructions for configuring *Write Away* for use with other printers.

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SOFTWARE PROFILE

Name: Write Away
Type: Word processor
System: Apple II, II+, IIe
Format: Disk
Language: Machine
Summary: Holds its own among the top sellers.
Price: $175
Manufacturer:
Midwest Software Associates
2707A Ridge Ct.
Lawrence, KS 66044

The files created by *Write Away* are standard Apple text files, readable by many other Apple word processors. You can also use *Write Away* to create EXEC files or to edit Applesoft programs—a great help when dealing with a long listing. Once you learn all of the features of the program, it can almost do *all* your writing for you.

Documentation

The documentation is a bit rough, but the tutorials are very helpful. If something in the manual is confusing, the tutorial examples clear it up. A few evenings or afternoons is all you will need to use most of *Write Away.*

Write Away has excellent error trapping, constantly prompting you when you are about to make a permanent change or delete a file. It is one of the few word processors that is *not* copy protected. I welcome this. Chances are that a word processor is in frequent use. The constant read/write access can cause a disk to crash at the worst possible time. Making your own backup is better than waiting three or four weeks for a replacement from the manufacturer.

The files created by Write Away are standard Apple text files, readable by many other Apple word processors.

Write Away is written for the Apple II, II+, and IIe. If you do not have upper/lowercase, they will send you a free E-Z Hook to make the necessary modifications, and you can also order a lowercase adapter.

Write Away from Midwest Software Associates has so much going for it—so many great features—that it can hold its own among the top sellers. It is an excellent choice for almost any user.

Format II—Enhanced Version

OK, I'll be honest from the beginning. *Format II* is a perplexing package. I found it difficult to use, exasperating, and a general pain in the buffer. But, lest you think I plan to trash it totally, read further.

Some word processors are designed for long manuscripts, such as books, master's theses, and the like. Others are designed for short, one- or two-page documents. *Format II* falls somewhere in between, and that is my main gripe with it.

creative computing
SOFTWARE PROFILE

Name: Format II, Enhanced Version
Type: Word processor
System: Apple II, II+, IIe
Format: Disk
Language: Machine
Summary: Perplexing storage method, but has redeeming features.
Price: $150
Manufacturer:
Kensington Microware
919 3rd Ave.
New York, NY 10022

After booting *Format II,* the screen clears and a menu appears at the top. At the bottom of the screen two question marks and a cursor ask for input. All you need do is enter one letter—no RETURN is required. To load a page from disk, just follow the prompts and press RETURN. A CONTROL-D sends you into the Editor.

Editing

At the Editor level, you can enter text and do simple editing. With *Format II,* what you see on the screen is what you get on paper. Solid bars at both top and bottom show the current margin settings, and a status display tells the current line and position on the page. To edit and change previously written text, press ESC to get to the Format Text mode. Here, you can search and replace text in either direction, both locally and globally. Novel features include a command to align columns of numbers, and a command to compress text, removing multiple spaces.

The printing capabilities of *Format II* are very powerful. A self-prompting menu lets you use almost any printer. By typing OPEN-APPLE and a number from 1 to 9, you have software control of print fonts—useful if your printer has enhanced, bold, or shadow printing. In some respects, the print features seem *too good* for *Format II.* Since text is stored as pages, you can print them in any order. The print features are very easy to use, and almost totally idiot-proof.

A mail system is included with *Format II,* organizing data in index card style. Data are entered onto a screen area of up to 16 fields. Up to 450 records or cards can fit on one disk. Sorting is easy and powerful. You do not have to set up a sort field at the beginning of the operation as you must with high priced database packages. Retrieve names and addresses for use in documents or for printing as mailing labels. This mini-database is much more powerful than I thought.

Documentation

The documentation is the best I have seen for a word processor. It was prepared by professional writers who slowly and gently lead you into using *Format II*. They realize that some people are impatient, so the Quick Guide Tutorial gives the bare bones. Don't stop there, though; the manual lets you in on every aspect of *Format II*.

My main complaint with *Format II* is that text is stored as individual pages. You can edit whole documents across pages; *Format II* searches through the disk for pages stored under the document name. But if you want to review a different page, you must reload it. That is time-consuming and frustrating. But that is really my only complaint.

Format II takes time to learn, offers some great features, and is a good choice for simple, light word processing and database storage. You can also back up the disk, freeing yourself from "crash-anxiety."

Home Word

The unfortunate fact about word processors is that it takes time to learn how to use them—more time than a casual user wants to invest. There is a market for a word processor that is quick to master and easy to use. Sierra On-Line produces *Screen Writer II*, one of the most popular word processors for the Apple. Their newest product is *Home Word*, a program that is easier to use than a game.

Home Word uses icons—pictorial representations—instead of control codes for most commands. It is specifically designed for a casual user—someone who just wants to write letters, simple papers, and memos.

After you boot the program, the screen is divided into three areas—the text page, the icon area, and an area representing what a completed page will look like. There are six main icons: Print, a printer; Edit, a page; File, a file cabinet; Format, a ragged page with an arrow leading to a neatly organized page; Customize, a question mark; and Disk Utilities, a floppy. A joystick or cursor keys move a frame over an icon. You hit RETURN or a joystick button to enter the selected mode. A second icon display replaces the first. At each command level, there are more icons.

Editing

As text is entered, a representation of the finished product is shown in the lower right of the screen. Words are small dots separated by tiny spaces. This area is updated after every few keystrokes. The icons are replaced by a graphic display of free disk space and free memory.

Home Word has many features found on more expensive and more complicated word processors. Global and local search and replace, underlining, boldface text, and print spooling and formatting are all here. Text can be taken from one file and inserted wherever you decide. A rudimentary outline generator is included for marking off specific areas of text with "bullets." The text can be previewed on screen before printing, giving you an idea of what the final copy will look like.

creative computing
SOFTWARE PROFILE

Name: HomeWord
Type: Word processor
System: Apple II, II+, IIe, soon to be available for others
Format: Disk
Language: Machine
Summary: Lisa-like competition for *Bank Street Writer*.
Price: Not set at press time.
Manufacturer:
Sierra On-Line
Sierra On-Line Building
Coarsegold, CA 93614

Documentation

I saw only the preliminary documentation, but that was fine, because *Home Word* doesn't *need* documentation. Keep it as a reference, and learn *Home Word* by using it. An instruction cassette is included. To use it, connect your cassette player to the Apple cassette I/O. The cassette player can be turned on and off with the joystick or cursor keys.

I like *Home Word*. I use it instead of *AppleWriter* if I want to write a letter to friends or a memo. *Home Word* will have enormous success, in banishing fear of computers. It is almost too easy to use!

Of course, *Home Word* will never replace *AppleWriter* or *Screen Writer II*. It isn't intended to do that. We all know people who don't use a computer because they think it is too complicated. *Home Word* will change that. The students in that third grade class had no problems using this software. Within an hour, they were writing short essays and letters without having any instructions or documentation on *Home Word*. I think that is the real test of user-friendly software.

Well, which word processor is best for you? Sorry, this is where I bow out. Each of the programs has its own strengths and weaknesses. The market is full of good word processing software. Try some out at your dealer and make a choice. Keep in mind that you will be using it for a long time. Try to predict what you might need to do in the future.

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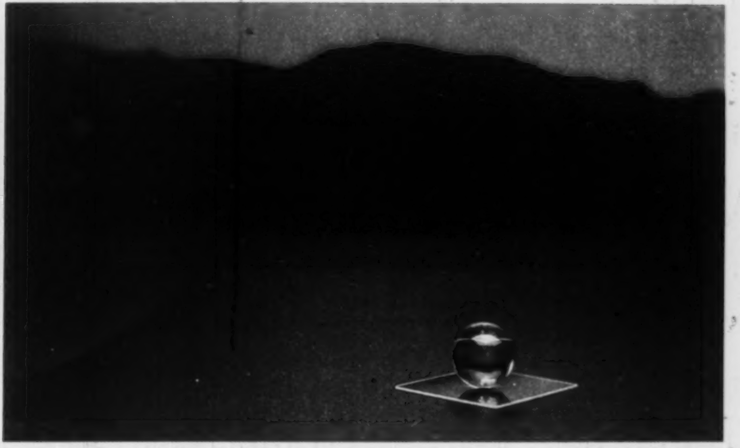

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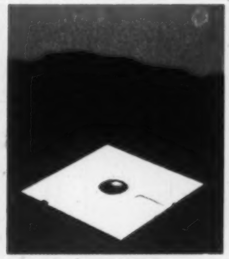

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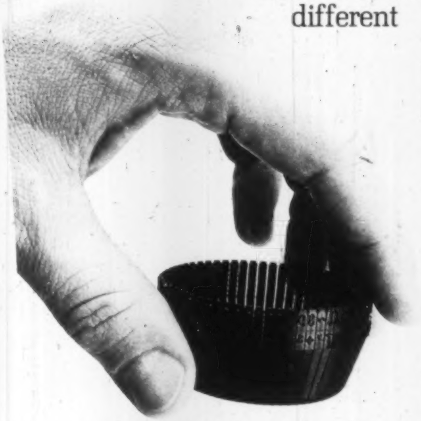

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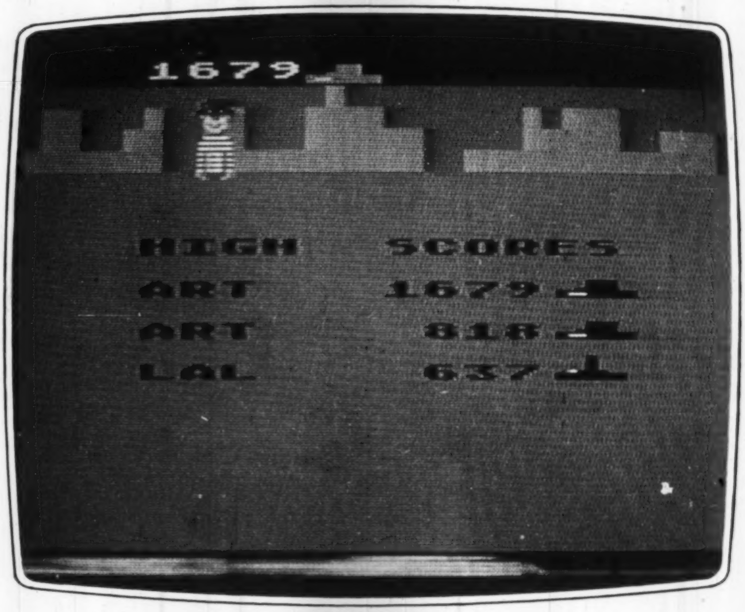
A Baker's Half Dozen Games for the Atari Computer

Arthur Leyenberger

Kaboom!

Like many Atari computer owners, I began my gaming/computing career with an Atari VCS. This was about the time that after-market companies began producing video games for the 10 million or so existing units. The scenario unfolded in a predictable fashion. Ex-Atari employees got together to form their own small video game company, producing games for the popular home unit. The rest is history.

One of the first of these entrepreneurial ventures was a company called Activision. Their hallmark was the VCS game that stretched the hardware to its limits and beyond. Graphics were usually better than anything seen before. They continue to be a leader in this area and have now begun to convert some of the more popular titles to the Atari 400/800.



HIGH SCORES
ART 1679
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Kaboom!

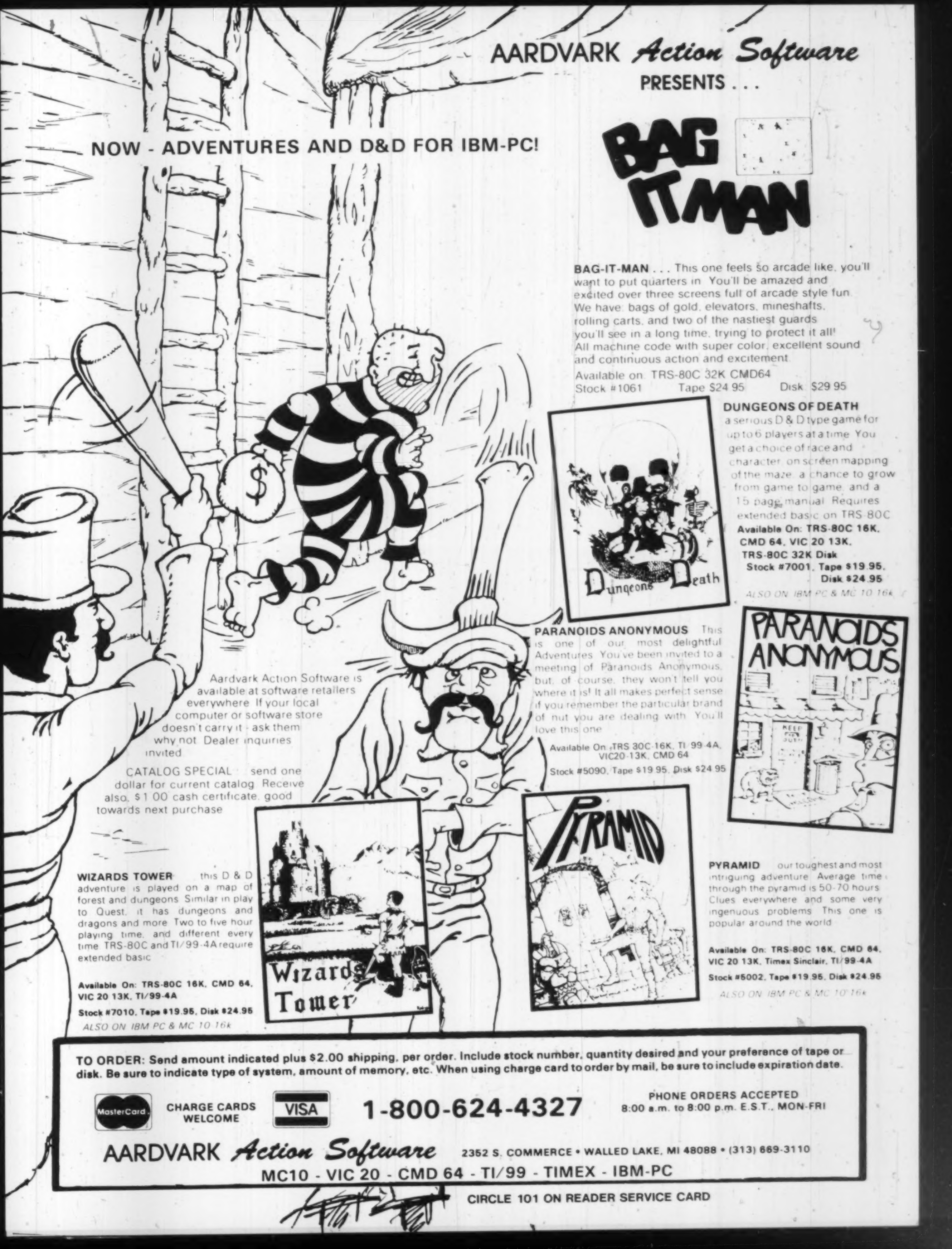
When I first played *Kaboom!* I was impressed by its graphics. Moreover, I was amazed that a game with such a simple theme could be so engrossing. A cartoon convict, called the Mad Bomber, dropped an endless supply of bombs with lighted, crackling fuses from the top of the screen. My task was to catch these bombs in one of my water buckets.

Initially I was armed with three buckets, and the bombs came faster and faster as the game progressed and the Bomber's zig-zagging movement across the screen became less predictable. If a single bomb was missed, the remaining on-screen bombs would explode and I would lose one of my buckets. Since I was a videogame novice at the time, I could never get past the third or fourth wave.

The new computer version of *Kaboom!* has some additional features, but before I describe them let me finish explaining the basic premise of the game. As mentioned before, the object of the game is to score as many points as possible by catching bombs dropped by the Mad Bomber. I don't know if the Bomber is angry, crazy, or both, but he is relentless. This is a game of skill and stamina.

The bombs are dropped in groups. The first level contains 10 bombs. After that, the count increases by 10 each level until level 6 is reached where there are

Arthur Leyenberger, c/o Creative Computing, 39 E. Hanover Ave., Morris Plains, NJ 07950.



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SOFTWARE PROFILE

Name: Kaboom!

Type: Twitch Game

System: Atari

Author: Larry Kaplan and Paul Wilson

Format: Cartridge

Language: Machine language

Summary: More fun than the VCS version.

Price: $34.95

Manufacturer:
Activision
2350 Bayshore Frontage Rd.
Mountain View, CA 94039

75 bombs. Level 7 has 100 bombs and level 8, the highest, has 150. The point values for each bomb caught equals the level number. The rate at which the Bomber drops the bombs steadily increases to the hectic pace of 13 bombs per second by level 8. That's 13 per *second*, Obiwan, so the Force had better be with you.

When a bomb is missed, you lose a bucket, and the number of bombs drops to half the number of the previous level. This is to give you a short breather, since the game cannot be paused. Let's hope that future Activision translations incorporate a pause feature. The individual point value also comes from the previous level.

For every 1000 points you get an extra bucket if you have less than the full complement of three. As each bomb is caught, part of the 1812 Overture is played. This musical feature is just one of the several enhancements the game received during its translation to the computer.

There are three game variations: one player vs. the Mad Bomber, two players taking turns against the Bomber and a pitch and catch game in which the two players alternate roles of playing the Bomber and catching the bombs. There are several control modes, and the control action is quite good. You may choose either large or small buckets and either paddle or joystick controllers. Your selection is displayed at the top of the screen with a little symbol of a large or small joystick or paddle.

This type of reaction game typically requires a paddle controller to make the game last more than a few microseconds. However, using the joystick was equally as good, and playability did not suffer at all. New features for the computer version in addition to the musical theme and the pitch and catch variation include a high scorers screen for the top four players' initials and a grin on the Mad Bomber when you miss.

Kaboom! for the Atari computer is just as much fun as the VCS version, and the additional features make it more enjoyable. It was initially designed by Larry Kaplan and adapted for the computer by Paul Willson. Good job, fellas.

Jumpman Junior

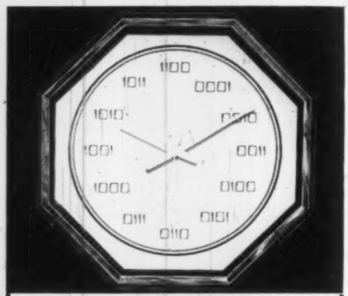
There are several climbing games for the Atari computer. One of the most popular is *Miner 2049er* by Big Five Software. Many of the other games are look-alikes that don't really add anything to the genre. *Jumpman Junior* is different. It is a climbing game that has enough challenge, features, and variation to satisfy any gamer. Let's take a closer look at this exciting game from Epyx.

The Jupiter Command Substation is being attacked by the Alienators who are bent on destroying this valuable outpost.

The situation is grim. The Jupiter Command Substation is being attacked by the Alienators who are bent on destroying this valuable outpost. Jumpman, Jupiter's super secret agent, is busy trying to restore communications at the Command Station. He is too busy to find and diffuse the bombs that have been placed throughout the twelve levels of the Station. That's where you, Jumpman Junior, come in.

Your task is to roam up and down the ladders, ropes, and elevators to reach and disarm the bombs. Your only weapons: your speed, agility, and jet boosters that let you leap away from bullets, electrocution traps, and moving walls.

Up to four players can compete, with each player taking a turn at the one joystick control. At the beginning of the game, the Jumpman's speed is selected for each player and lasts for the remainder of the game. Each player gets four lives. There are 12 different screens. Since the first two levels are fairly easy you begin the game with a feeling of confidence. This feeling is short-lived since,



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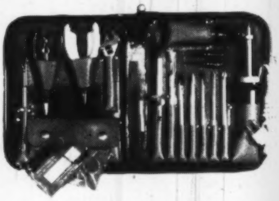

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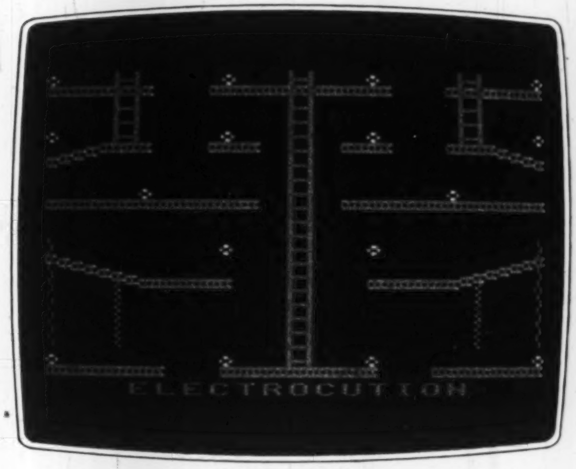
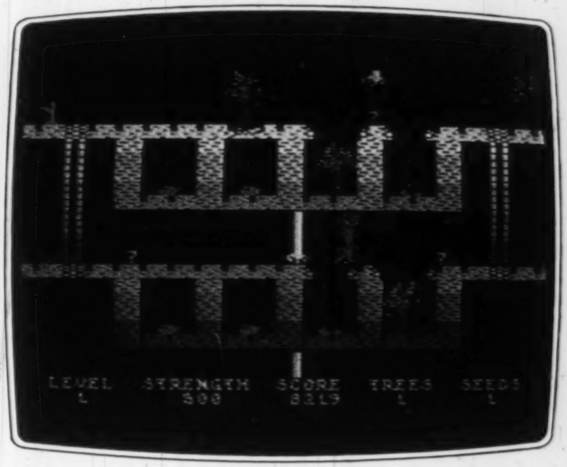


Jumpman Junior



Necromancer

creative computing

SOFTWARE PROFILE

Name: Jumpman Junior
Type: Climbing Game
System: Atari
Author: Randy Glover
Format: Cartridge
Language: Machine language
Summary: A very playable game.
Price: $39.95
Manufacturer:
Epyx/Automated Simulations
1043 Kiel Ct.
Sunnyvale, CA 94086

by the fifth level, the challenge is considerable.

You would expect the jumping movement to be short and precise given the increased gravity of the planet Jupiter, but it is actually quite the contrary. The jumps are slow and J-man Jr. appears to drift in the direction that he is headed. A nice effect.

Jumpman Junior was designed and programmed by Randy Glover. In addition to giving us a very playable and enjoyable game, Randy included a pregame show. That's right, when the title screen is first displayed, a group of Jumpmen perform a little dance to the sound of a light-hearted tune. This is just one of the many nice features of this game.

Necromancer

Necromancer is one of the strangest, yet most imaginative, games I have ever played on the Atari computer. This old gamester has seen a lot of games and very few match the originality and playability of this one. It is a fascinating combination of fantasy and action.

The title screen depicts a lonely tree sparkling like a gem while a hauntingly beautiful melody sets the mood for a trip into the world of fantasy. Darkness is upon the land. You are Illuminar, a druid, defender of truth and protector of the human race. You alone must face the mighty conjurer, the Necromancer.

The game resembles a three-act play. The first screen is the problem definition and sets the mood for the players. Screen 2 is the conflict and screen 3 is the resolution.

As you move your druid and trees about the vaults, you must avoid the Hands of Fate that descend from the ceiling.

In the first act of this fantasy, you must restore the forests by planting a glade of enchanted trees and protecting them from hordes of attacking Troglodytes. Your only weapon is a magical wisp that is hurled at an opponent and obediently returns to your hand. The wisp is also used to plant the seedlings that will eventually become your army of trees.

The ogres like to stomp down young trees, so as the trees are growing you must destroy the ogres while planting new seedlings. This is all done with your joystick-controlled wisp. Full grown trees are safe from the attacking Troglodytes but are prey for the forest spider.

creative computing

SOFTWARE PROFILE

Name: Necromancer
Type: Game
System: 32K Atari
Author: Bill Williams
Format: Disk
Language: Machine language
Summary: One of the strangest and most appealing games ever.
Price: $34.95
Manufacturer:
Synapse Software
5221 Central Ave.
Richmond, CA 94804

The spider will poison any adult tree that he finds. When this happens, a face appears on the tree, and it begins to cry for help. You must then wipe off the face with your wisp before it dies and becomes a useless stump. Your goal is to grow as many trees as you can since they will aid you in attacking the evil Necromancer himself.

When your strength runs out in act one, you and your trees are transported to the spider vaults. In act two your mission is to destroy as many spider larvae as you can before descending to meet the Necromancer. As bizarre music plays, you use your wisp to pick up a tree from the tree bin and walk it to the top of a spider vault. Once the tree is placed there, its roots begin growing and eventually break up the bricks, causing the tree to come crashing down on top of the spider larvae. After the larvae are destroyed, the tree is returned to your bin

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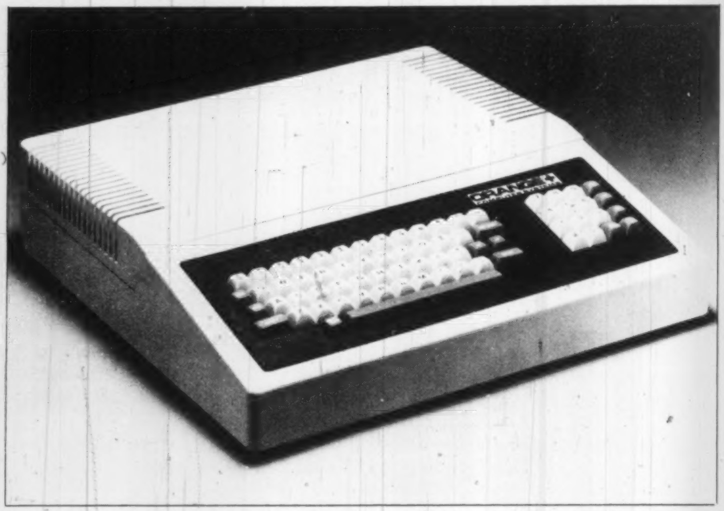

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to be used again. The tree bin contains the arsenal of trees that were grown in act one.

As you move your druid and trees about the vaults, you must avoid the Hands of Fate that descend from the ceiling. If they grab you, you will be pulled screaming into the sky. If they grab one of your trees, you have lost that tree for good. The hands occasionally drop objects such as mystery prizes and janitors.

Mystery prizes are indicated by a question mark and are claimed by walking over one with your druid. The first mystery prize lowers ladders which offer access to the level below. Additional mystery prizes may raise ladders, give you bonus points, or deplete your strength.

The Necromancer employs Ceygolian Janitors to pick up stray question marks left by the hands. The janitors wander aimlessly around the vaults until they are picked up by the hands or walk off the screen. If your druid happens to bump into a janitor, you will get extra strength.

Throughout act two, you must avoid the deadly salivating spiders which evolve from the spider larvae. These nasty devils eat trees and spit poison. Your wisp is the only defense against the spiders. When you exit the fifth level of the vaults, you get a bonus for every tree you have left in your tree bin. You also enter act three and get a chance to meet the Necromancer.

Act three is the Necromancer's lair. Your mission is simple: destroy all of the Necromancer's graves to rid the world forever of his evil. The gravestones are removed by walking your druid over them. The evil one appears only on graves that still have their headstones. He appears and disappears. If he touches you, he will suck your strength until you either kill him or escape. Killing the Necromancer with your wisp gives you strength, but he will reincarnate himself.

The Necromancer hatches all of the spider larvae you have left behind in act two and turns them into zombie spiders which can also suck your strength away or be killed by you. You can never destroy all of the zombie spiders because the Necromancer continually reincarnates them.

If things were not bad enough, there is also a mother spider that looks for zombie spiders and mutates them into immortal spiders. Immortal spiders cannot be killed. When you have removed all 13 headstones, you get bonus points and advance to the next level. When you grab the last headstone on level 5, you have succeeded in ridding the world of the evil Necromancer. The forest explodes in a rainbow of colors.

Bill Williams has created a game that has real staying power. *Necromancer* is well conceived and beautifully implemented. The sound and graphics are out of this world. This game has and will continue to get a great deal of play on my Atari. Synapse, you have done it again.

Archon

What do you get when you cross chess, dungeons and dragons, and combat? Give up? You get, to quote Monty Python, something completely different: Archon.

Archon from Electronic Arts combines the strategy of a board game with the excitement and action of an arcade game. It depicts the classic struggle between light and darkness, good and evil. The battle between the opposing forces is drawn from myth and legend and begins as an electronic boardgame. The strength and number of the Light Side and the Dark Side are equal. However, the players and their individual powers are not.

creative computing

SOFTWARE PROFILE

Name: Archon

Type: Strategy/Action Game

System: 32K Atari

Author: John Freeman, Anne Westfall, Paul Reiche

Format: Disk

Language: Machine language

Summary: An excellent game that goes beyond chess.

Price: $39.95

Manufacturer:
Electronic Arts
2755 Campus Dr.
San Mateo, CA 94403

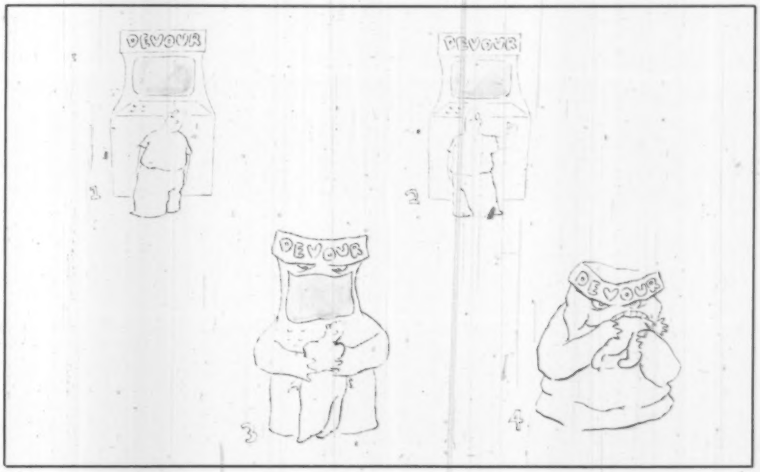
There are 18 icons per side, each made up of eight different players. Each piece can move in a particular manner which is displayed at the bottom of the screen as the piece is moved. The first screen is the board screen. A 9 x 9 grid composed of black, white, and luminosity squares. The black and white squares maintain their color throughout the game while the luminosity squares vary in brightness during the game.

The luminosity cycle continues throughout the game, back and forth from dark to light, shifting gradually after every other turn. The lighter the square, the more power the light icons have doing battle on that square and vice versa for the dark pieces.

Did I say battle? I sure did! Unlike chess where mere possession of a square grants ownership, landing on an occupied square in *Archon* requires that the two icons battle it out for ownership. The battle is a real-time fight under joystick control displayed on the second screen, the battlefield. Good coordination, a quick wit, and a thorough understanding of the various weapons that each piece possesses is mandatory for success. It is tantamount to suicide to challenge an opponent on his own colored square.

In addition to the luminosity squares, there are five Power Points. Their position is indicated on the board screen by flashing dots. Capturing all five points wins you the game, as does eliminating all of your opponent's pieces. Icons residing on Power Points heal faster than usual and are protected from the effects of magic spells.

Archon is primarily a two-player game. You can challenge the computer but you would probably be more successful trying to jump start a 747.



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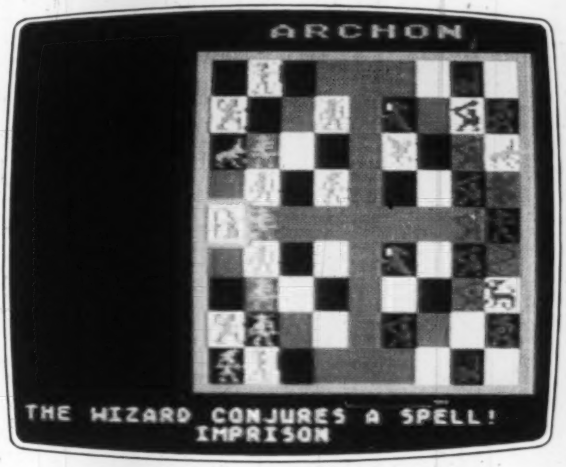
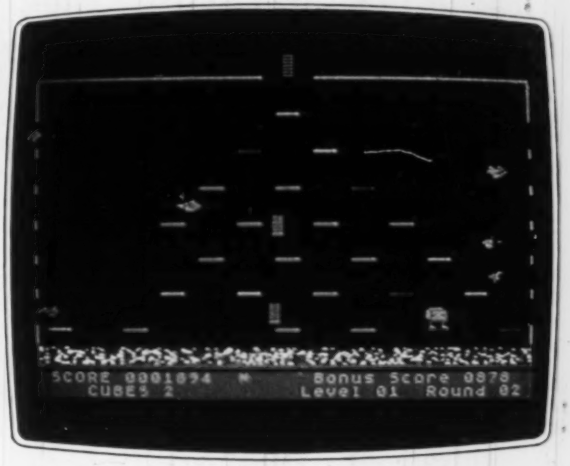


Archon



Mr. Cool

The best way to learn the game is to watch the computer play itself. This will occur within two minutes after the game is loaded. With the excellent manual in hand, watch the strategy and action take place on the screen and follow along. The game can be paused at any time to give you a chance to see who is fighting whom and what their specific powers might be.

Archon is a great game, a classic. Like all of the games from Electronic Arts, it requires total involvement. Electronic Arts views the computer as a new creative medium. They view their program authors as artists and their product managers as producers.

Jon Freeman, Anne Westfall, and Paul Reiche III are the artists responsible for *Archon*. The packaging resembles a record album, complete with liner notes and artist biography. The manual is also excellent. It contains the rules, strategy, tips, and even a question and answer section.

Archon is one fine game from Electronic Arts, a company from which I look forward to hearing more.

Mr. Cool

The hundreds of games for the Atari computer fall into a handful of categories. There are shoot-'em-ups, adventures, climbing games, simulations, maze games, and jumping games. In the latter category is a new game called *Mr. Cool* from Sierra On-line.

Mr. Cool is a jumping or hopping game that pits the player against such formidable dangers as sizzling hot plates, fireballs, and hot and cold running springs. No, I am not making this up. Our hero must turn the fireballs into snowballs and cool off the hot plates.

Mr. Cool is really a square—er, a cube. His goal is to match the color of the hot plates with the top border of the playing field. If he is hit by a fireball or spring he melts to death at the bottom of the screen. If he is lucky, he can absorb the springs and fireballs and earn extra points.

The joystick action is diagonal which, for some people who tried the game, posed a coordination problem. There are 15 rounds per level, and the levels go on forever, or at least until your fingers fall off. The main task is to hop onto a plate and change its color to match the color at the top of the screen. Sometimes one bounce is all that is needed. At higher rounds, several hops onto a plate are required to get it to the correct color. Extra points are awarded for completing a screen within a specified time period.

Programmed by Peter Oliphant, this game resembles the popular arcade game Q-Bert, but without the beautifully colored screen. That is not to say that the game is not fun to play or challenging enough.

Indeed, the game is very difficult above the second level and results, at least for this gamester, in frustration. Perhaps someone under 30 would fare better with *Mr. Cool*. But for some reason I like *Mr. Cool* and at least until Q-Bert becomes available for the Atari, I'll put my mittens on and keep trying to beat *Mr. Cool*.

creative computing

SOFTWARE PROFILE

Name: Mr. Cool

Type: Hopping Game

System: Atari

Author: Peter Oliphant

Format: Cartridge

Summary: Playable until Q-Bert arrives.

Price: $32.95

Manufacturer:
Sierra On-Line, Inc.
Sierra On-Line Building
Coarsegold, CA 93614

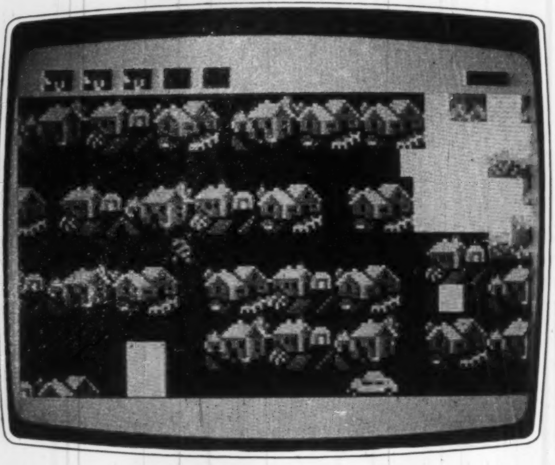
Atari bought the rights to E.T. for more money than the gross national product of most third-world countries.

E.T.

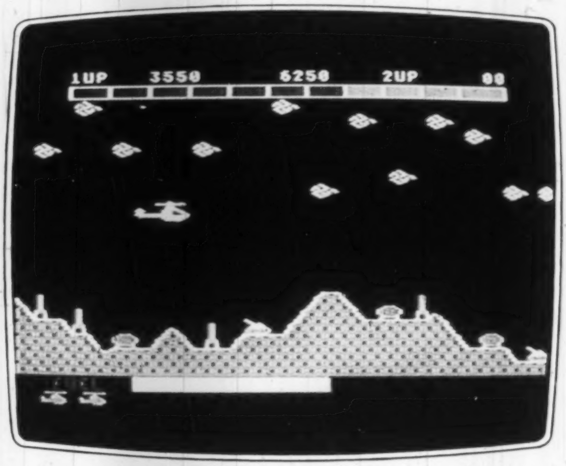
Joining the glut of such movie spin-off products as Pac-Man cereal, T-shirts, and lunchboxes, is the recent rash of E.T. dolls, bubblegum cards, and jewelry. Why not, then, have an E.T. game for the Atari computer? A better question might be: Why *have* an E.T. game?

Atari bought the rights to E.T. for more money than the gross national product of most third-world countries. They then rushed the product to market faster than you could say, "E.T. Phone Home." As a result, the game is simplistic and will appeal primarily to children under the age of ten.

The scene opens with Elliot, E.T.'s friend, searching his neighborhood for parts that can be used to build an intergalactic telephone. The joystick-controlled Elliot is scrolled through a map



E.T.



Super Cobra

of suburbia and the forest. Elliot gets telepathic messages from E.T. concerning what parts are needed.

During play, scientists and other bad guys roam the area in search of the extraterrestrial. The parts are invisible to them unless Elliot is carrying one, in which case they can take and hide it. E.T.'s life energy continually diminishes so Elliot must hurry.

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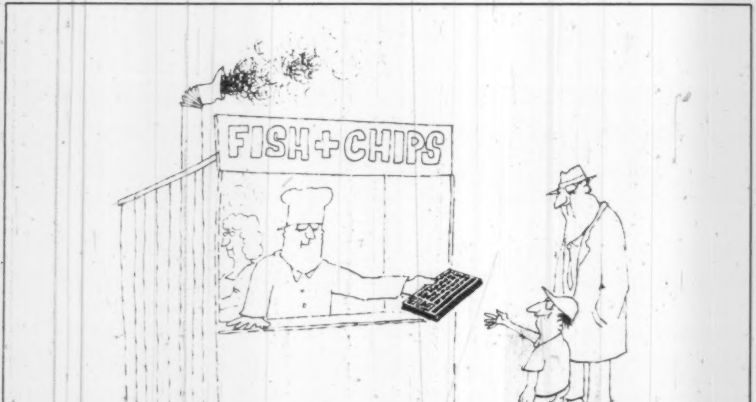
SOFTWARE PROFILE

Name: E.T.
Type: Game
System: Atari
Format: Cartridge
Summary: Atari, Phone for Help.
Price: $49.95
Manufacturer:
Atari, Inc.
1265 Borregas Ave.
Sunnyvale, CA 94086

Once all of the parts are located and returned to Elliot's house, the player hears "E.T. Phone Home" through the television speaker and must guide E.T. to the forest landing site to be picked up by his pals. The space ship lands, and E.T. slowly disappears into the waiting ship. E.T. goes home.

The easier levels require Elliott to collect only four parts. At higher levels, as many as ten parts must be returned to Elliot's house before E.T. runs out of energy. Each time E.T. is asked to telepathically remind the player what parts are needed, some of his energy is drained.

Nine different difficulty levels lengthen the duration of the game rather than add to the excitement of it. The graphics are crude and the game does not have much staying power. Clearly a child's game, *E.T.* from Atari is a disappointment for anyone old enough to be reading this review.



Super Cobra

When I first booted *Super Cobra,* I thought, "Oh, no, just another horizontally scrolling shoot-'em-up like Caverns of Mars II." After logging over a dozen hours at the controls, I have changed my mind.

The game scenario puts you in the pilot's seat of a helicopter equipped with two weapons. You have a machine gun that fires directly in front of the ship. The sound of the machine gun is excellent and almost requires that you attach an amplifier and speakers to the video/audio monitor jack of the Atari 800.

Bombs, your other weapon, are released from the bottom of the 'copter. They have a good trajectory and sound

creative computing

SOFTWARE PROFILE

Name: Super Cobra
Type: Game
System: Atari
Format: Cartridge
Summary: Nice rendition of the arcade classic.
Price: $39.95
Manufacturer:
Parker Brothers
50 Dunham Rd.
Beverly, MA 01915

very realistic when they explode. But what do you use these weapons for? That depends on the particular screen you happen to be viewing.

Throughout the game, the horizontal movement is always from left to right. Your speed is constant but you may move forward or backward within a window. At first your enemies are below. Missiles are launched vertically and tanks fire at you diagonally as you fly over the cityscape. The graphics are very colorful and add to the enjoyment of the game.

The scene changes every two screens. After the cityscape, you must fly through a cave. Sometimes the cave width is quite wide. At other times, the opening is very narrow and requires absolute concentration to navigate correctly. Then meteors appear in open space. The rocks appear out of nowhere, and you must maneuver quickly and shoot accurately to destroy them.

> ***The game can be paused at any time, which is quite useful given the hectic pace of the game.***

This scene is followed by meteors guarding the cave openings. The meteors must be dealt with before the cave can be entered. Next come flying saucers over a mountain range followed by flying saucers in the caves. The final screen, and the one I have yet to complete, is a maze with right angle corners. Moving forward and backward while climbing or descending is extremely challenging. This one screen alone will keep you busy for hours.

The game can be paused at any time, which is quite useful given the hectic pace of the game. An especially good feature of *Super Cobra* is that when you have lost all of your ships and continue playing, you can resume at the same level. This is a very intelligent arrangement that should be implemented by more game vendors.

Parker Brothers has done a respectable job translating this arcade hit to the Atari computer. Although similar to other horizontally scrolling games, *Super Cobra* is much more challenging and has better graphics. It will please any shoot-'em-up fan, especially if the sound is cranked up all the way. END

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Our Readers Are More Responsive

In the September 1983 issue of *Creative Computing*, we ran a small contest for readers to write a legible listing program. The contest announcement was buried on page 150 in the last paragraph of an article about the TRS-80 Model 100.

By September 7, we had received over 50 entries. They were for all kinds of computers—Apple, Atari, Osborne, IBM XT, Compaq, Heath, NEC, Eagle, Commodore and others. A week later, the volume of entries had become a tidal wave.

It is not only contests to which our readers respond. For the first six issues of 1983, with only half of the results for May and June counted, *Creative Computing* delivered 1,881,730 inquiries to advertisers. For the year, the number will easily top four million.

While full-page color ads generate barrels of inquiries, readers don't overlook the small ones. It's not unusual for a 1/4 page ad to generate 1000 or more inquiries.

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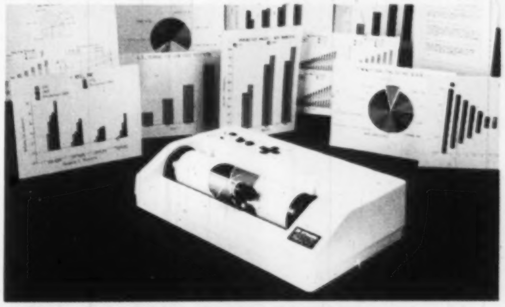

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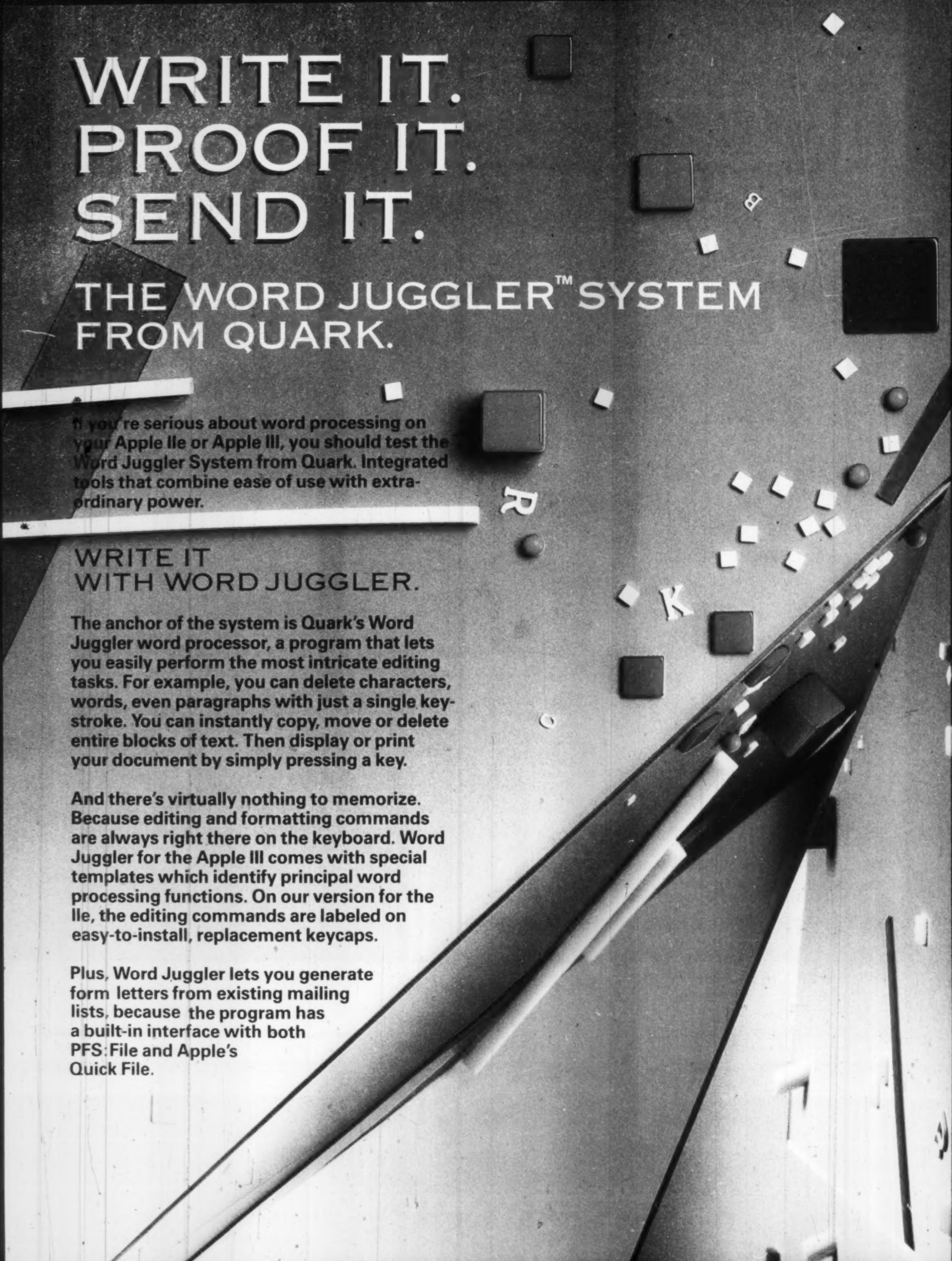

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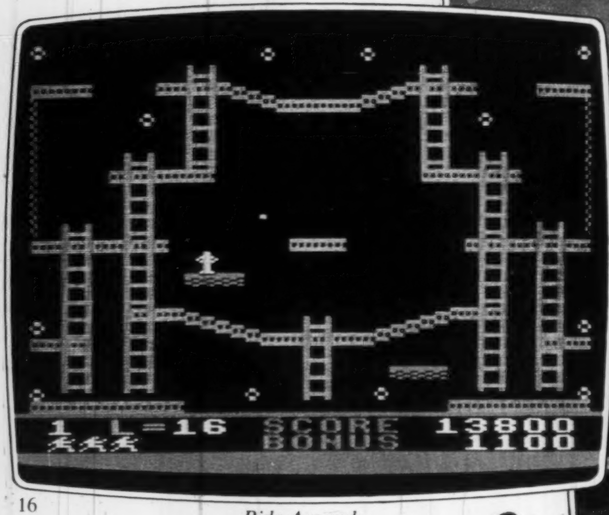
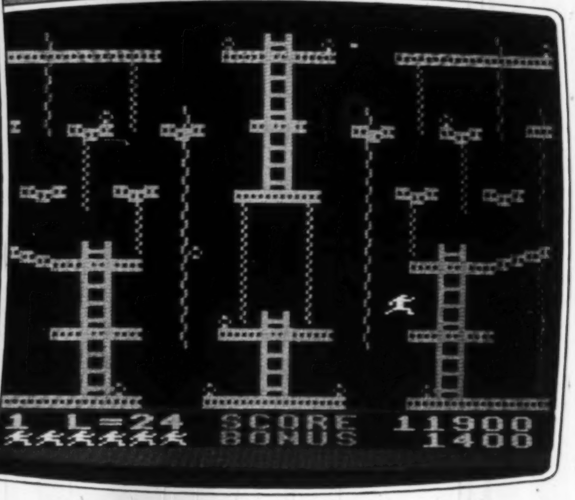
mastering JUMPMAN



16

Ride Around



24

The Jungle

David H. Ahl and Betsy Staples

Who is Jumpman?

Jumpman gets our nomination for Best Game of 1983. It has everything we look for in a game: playability, opportunity for improvement, clever tricks to challenge your intellect, and just the right amount of randomness to keep you on your toes. But it certainly can be frustrating and time-consuming as you sacrifice man after man devising patterns and studying the effects of your movements.

Jumpman is available for Atari, Commodore 64, and Apple computers. A second version with fewer boards, *Jumpman Jr.*, is available on cartridge for Atari and Commodore machines. Our description of playing strategies presented here is for the full version with 30 boards.

During many hours of play, we have developed some strategies and patterns. We have not, however, presented a pattern for every one of the 30 boards—that wouldn't leave you with any challenge at all. Instead, we have presented some general playing hints, patterns for 14 boards, and tips for seven of the other boards.

General Hints

First hint: read the instructions. This may sound silly; it is easy to play the game without reading the instructions. However, there are many valuable tips in them, including some hints from game designer Randy Glover.

Start off with the default speed (4). If you just can't seem to clear a board at this speed—after some practice, of course—then choose a slower speed.

Our patterns work at all speeds. They work best at the default speed (4). Faster speeds (1, 2, and 3) require you to hesitate in certain spots, so you should become familiar with the pattern on speed 4 before you speed up to 1, 2, or 3. Remember, the bullets and other hazards move faster and occur more frequently at the faster speeds; this can wreak havoc with the completion of a pattern.

On the very slow speeds, the patterns may require some alteration; we did not try every one at every speed.

Bullets move slowly across the screen until they cross the plane on which you

ARCADE CLASSICS.
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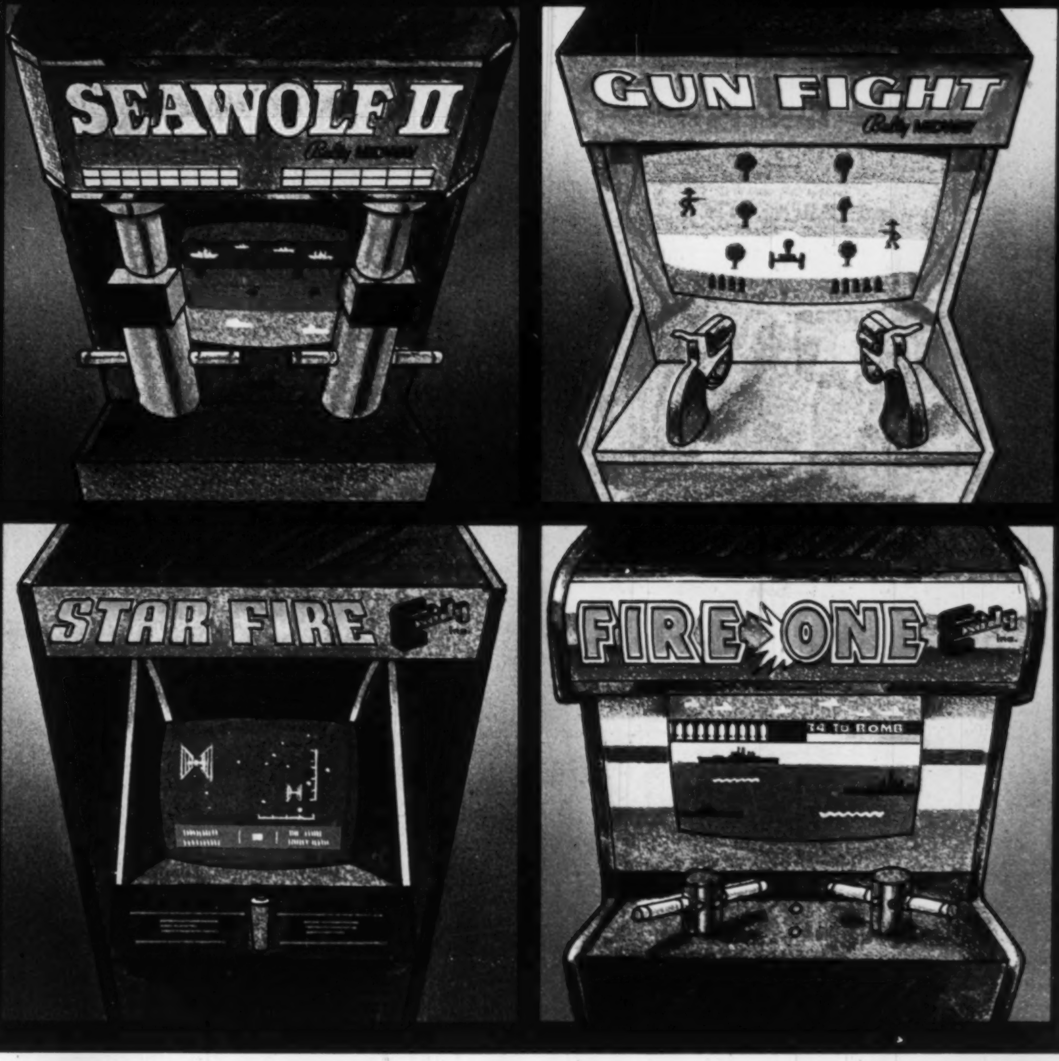
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14 To BOMB

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are located. They then explode and sail toward you with frightening speed and accuracy. Watch for them and try to get them to explode when you are in a position to change planes rapidly. If necessary, wait for them to fly by before continuing. Don't alter your pattern because a slow bullet or two appears on the screen; keep going, but always have in mind a possible escape route should the bullet speed up.

Learn to recognize up and down ropes quickly (Up—blue, small links; Down—green, large links). A rope occasionally apears after you collect a bomb, and you should know immediately which kind it is.

It is possible to jump on and off ropes, but it is more hazardous than jumping on and off ladders. You will get lots of rope jumping practice on board 3, Bombs Away.

You can jump over most of the hazards if they are reasonably close to the girders. These include bullets, barrels, vampires, and blocks. You can jump some of the robots but not others. In general, we prefer to avoid the hazards instead of risking a life trying to jump over one, but if you are cornered, try it; you have no other choice, and you may be successful.

The beginner level consists of boards 1 to 8, intermediate level is boards 9 to 18, and advanced level is boards 19 to 30.

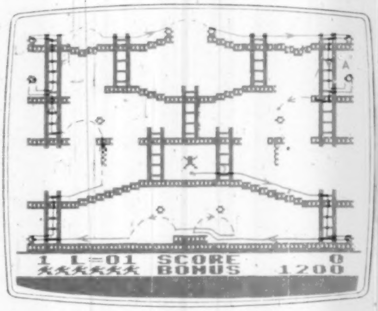
Screen by Screen

1. Easy Does It

On this board, simply follow the diagram. You should pause only to let a bullet go by, although very few bullets speed up on this board, so you frequently can outrun them.

On the bottom level, do not jump on the platform at the center; just walk onto it and jump first to the right to get the bomb. Then walk onto it again and jump off to the left as you continue around. After getting the next-to-last bomb (A), a portion of the ladder below you will break away. Go down it a short way, but immediately jump to the left to get the last bomb. This is a suicide leap—you will not live if you miss the bomb, but if you touch the bomb, the screen ends and you do not lose your life. After a bit of practice, you will make it every time.

At the normal speed, you will get 1200 points for collecting the 12 bombs, and 800 to 1000 bonus points, for a total of around 2000.



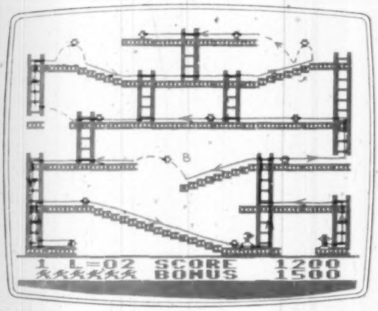
1 *Easy Does It*

2. Robots I

The pattern for Robots I should be followed without hesitation. The only tricky jump is the first one (B). Don't wait until you are at the very bottom of the ramp to leap, but don't leap too soon either. Practice makes perfect.

There are no bullets on this board, only the pesky robots.

As you climb the ladder at the right side of the board, you will notice the robot at the top start to descend. Don't stop to watch or he will cut off your path to the left. You ignore him, and he will ignore you.

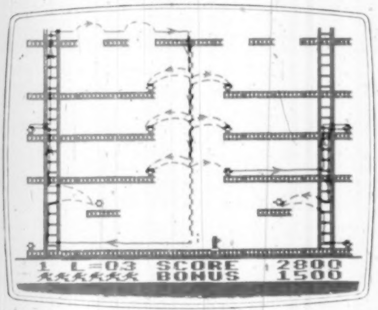


2 *Robots I*

You may want to try to leap up to the top girders from the left side. It is possible, but it seems to be easier to do from the right. If you do make it up on the left side, then simply jump off the right side in a suicide leap to get the last bomb. If you complete the lefthand leap successfully, it is worth an additional 100 bonus points; otherwise you will have to be satisfied with 1200 regular points and 800 to 900 bonus points on this board.

3. Bombs Away

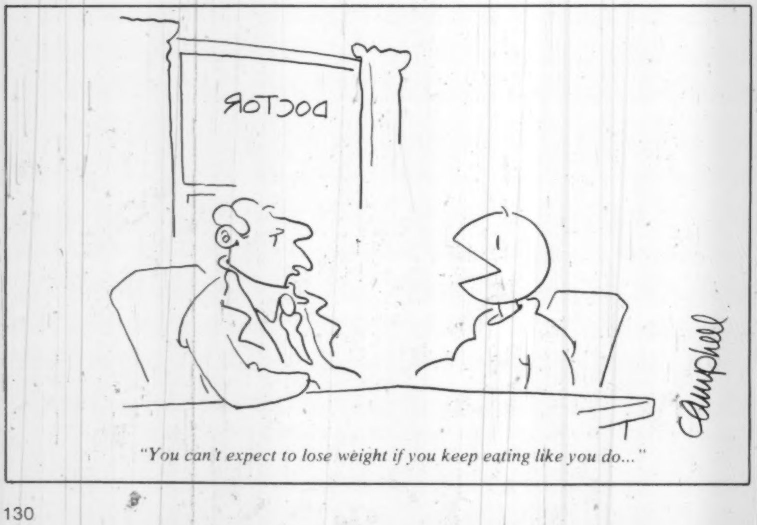
On this board you will get some good practice jumping from platforms to ropes that will help you later on. As you get the bombs on the left side, portions of the platforms will drop away, forcing you to go to the very top. Here you are most vulnerable to the falling bombs, so your best strategy is to run and leap to the center as fast as possible to start your descent down the center rope.



3 *Bombs Away*

This is a down-only rope, so if you get past a level, you have no recourse but to get off on the next level and make your way back up, or to go all the way down and climb a ladder back to the top.

If you are anywhere but on the top level, you can usually move or jump out of the way of a falling bomb and let it go past. You can look for 1200 regular points and 600 to 800 bonus points on this board.



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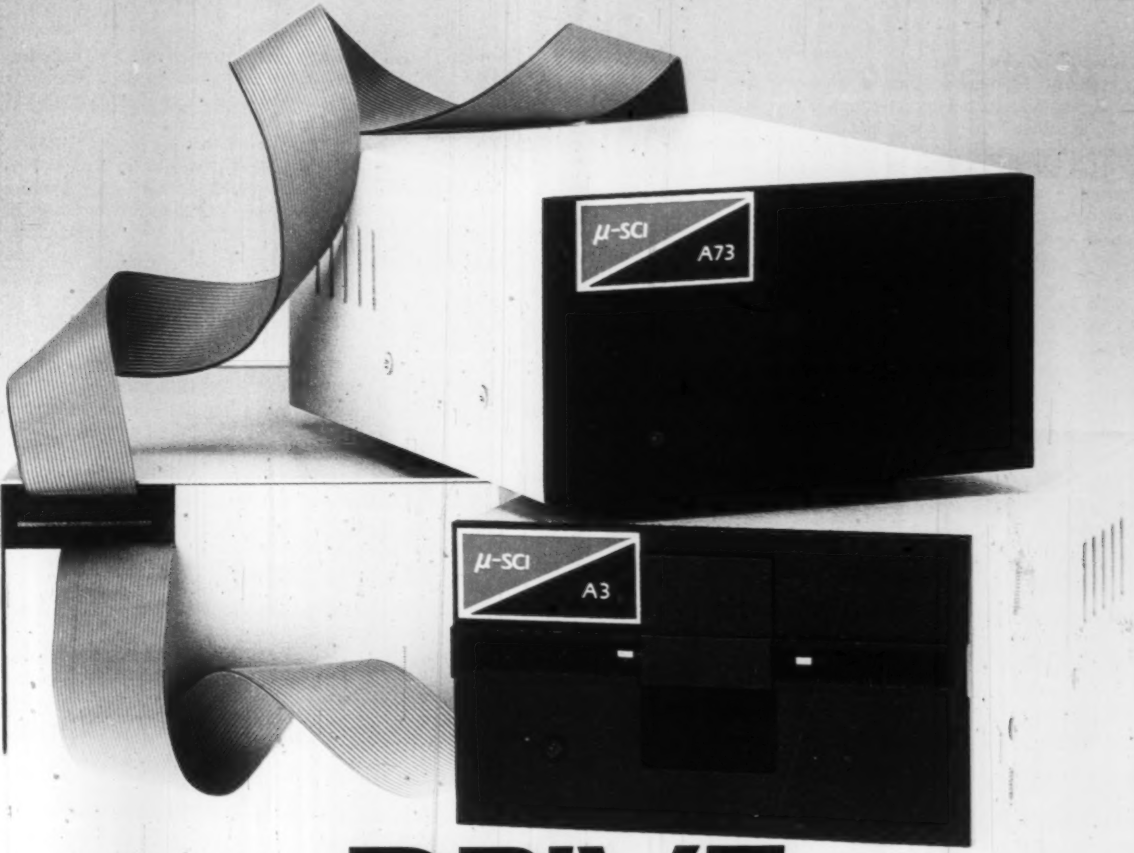

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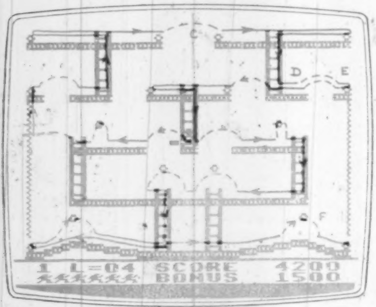
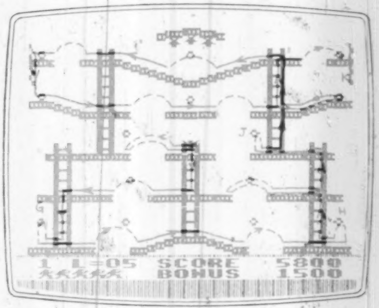
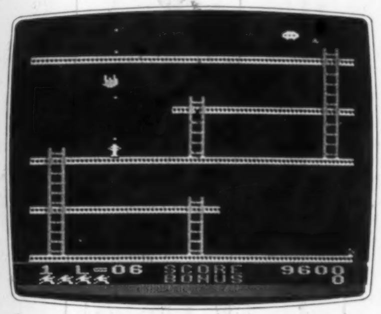


4 *Jumping Blocks*



5 *Vampire*



6 *Invasion*

4. Jumping Blocks

On this board, there are glowing blocks that are similar to bullets, although not nearly as lethal. When a block hits you, it will make you jump—usually straight up—but sometimes in an unpredictable direction. Hence, if you see a block approaching, it is usually best to get away from the edge of a platform. Then, even if the block forces you to jump in an undesired direction, you will still land on a solid surface. You can jump over the blocks, but it is usually not worth the trouble.

You are most vulnerable to the blocks when you ascend the two ropes at the sides, since a jump while on a rope results in instant death. Hence, our pattern minimizes the use of these ropes.

The really nasty jump is the one at the top (C). Start running from the left, keep your joystick pressed right, don't hesitate, and press the jump button at the last moment. Even if Jumpman just catches the right platform with his hand, at least he is over, and you can go on.

When leaping to the right platform (E), press the jump button a little way back from the edge of D, otherwise you will jump beyond the platform.

Be careful making the jump for the next-to-last block (F); if you jump too late you will crash into the up-rope, which is generally lethal.

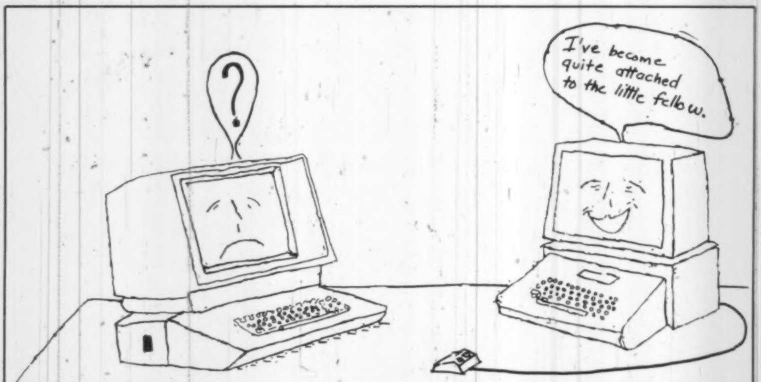
5. Vampire

Vampire is a nasty board with nasty creatures that most players come to hate. At least there are no bullets.

The three vampires cling to their perch until you have collected a certain number of bombs. In general, they fly from top to bottom, and then reappear again at the top, but this pattern is altered if they get the smell of blood—then they stay on your trail. The first vampire comes out after you capture the third bomb, the second after the sixth, and the third after the ninth.

If you follow our pattern, the first vampire is released after you get the bomb at the bottom left (G). The second is released when you get the bottom right bomb (H). Here you need to exercise a bit of judgment; you should get the bomb at the second level when the first vampire is below you (going off the bottom of the screen) and the second one is above the bomb.

When you get it, jump immediately back right and go up the ladder. The second vampire now should be below you. Taking the bomb at J releases the third vampire. As you complete the pattern, vampires occasionally get quite close, but you should be able to avoid them.


?
I've become quite attached to the little fellow.

It is possible to leap over a vampire, but it is better to avoid them. Remember, you are a much better target for the vampires when you are standing still than when you are moving. You can generally outwit one vampire, but when there are three on your tail, forget it! This board is very discouraging at first—be sure to keep moving and your chances of survival will increase.

A quirk. The rope from the top right platform (K) is very difficult to climb down (could it be a bug in the program?). It is best to avoid this if at all possible.

Look for 1400 regular points and 600 or so bonus points on this board.

6. Invasion

This is a trivial board, but a good place to amass points if you are very patient. All you have to do to finish it is get the bomb at the bottom right. The only hazards are some flying saucers which fly in random patterns, but they don't zero in on you like the robots and vampires. On the other hand, if one hits you, you're dead.

You get 25 bonus points for shooting a saucer. Just point your joystick in the direction you want to shoot, and hit the button. You can have only four shots in the air at a time.

The only dangerous place on this board is on the top platform because if a saucer approaches from above, you can't see it until it is too late. Your best defense is a good offense. Since the saucers fly away from your bullets, shoot around yourself in all directions as you move to the right across the top platform.

Move to the center of the middle platform and stay there as long as you want to continue shooting saucers. Actually, it gets quite boring after a short while, and you will want to move on.

As a general rule, if you are playing the beginner or grand loop option, at this point you should have 10,000 to 11,000 points.

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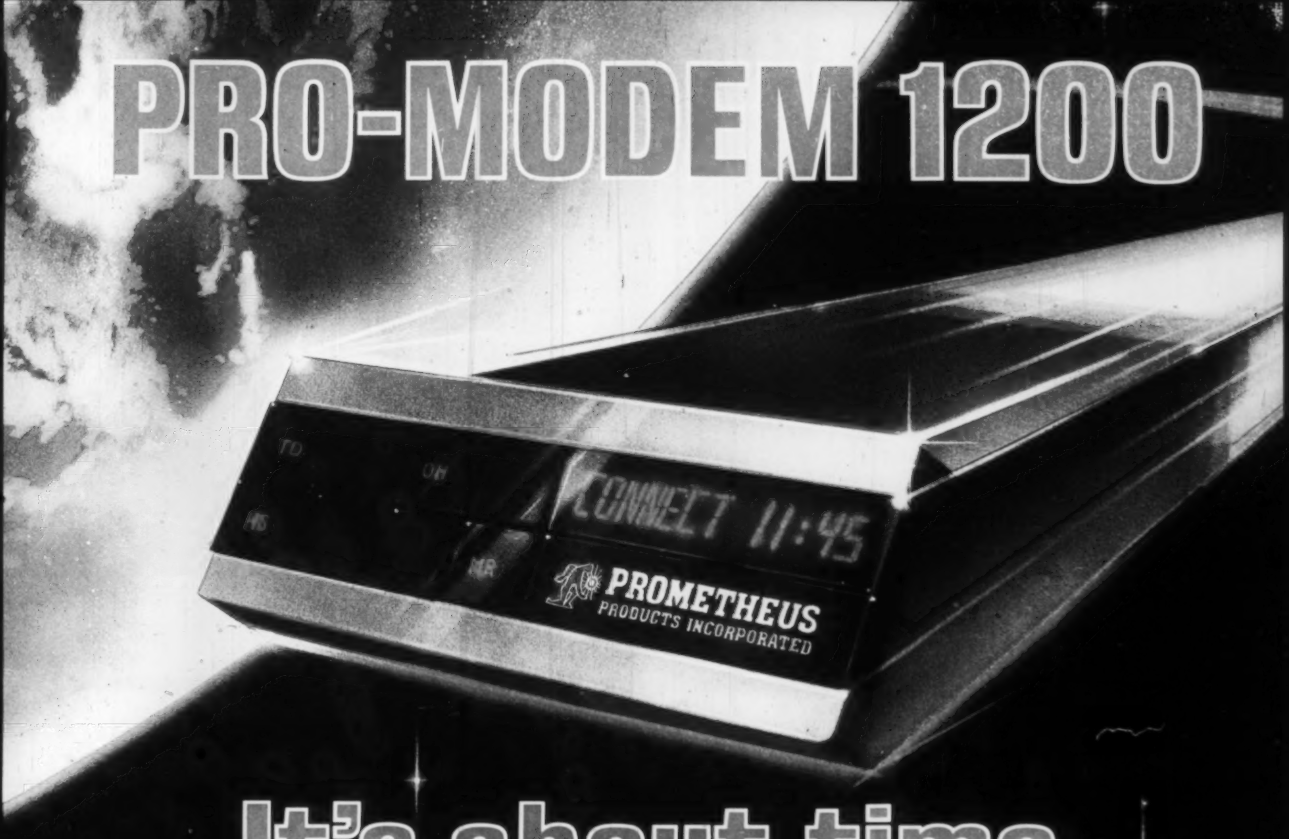

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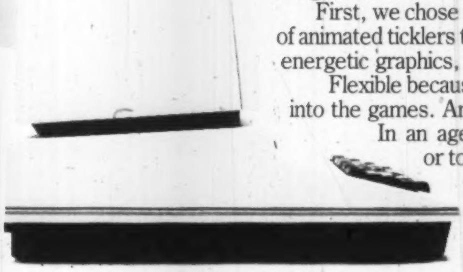

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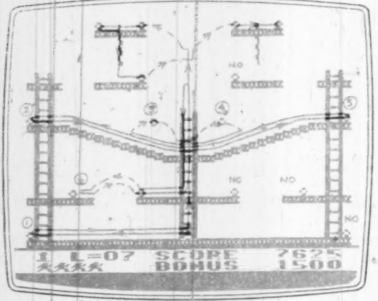
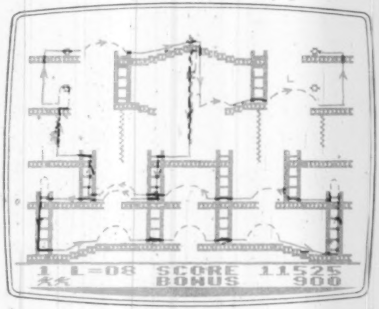


7 *Grand Puzzle I*



8 *Builder*

7. Grand Puzzle I

The secret to this board is knowing in what order to add six sections to the center ladder to build it higher so you can collect the 500-point bombs at the top.

Basically, the ladder sections, which you get by retrieving the six bombs near the outside ladders, can be placed in any order on the center ladder.

But to save building time, the two pieces next to the center ladder (3 and 4) may be used anytime after at least two ladder sections have been put up.

The board will automatically end when there are four bombs left. Hence, you should leave the bombs marked "No."

The leap from the top of the ladder to the top platforms is a dangerous one, but helped by you, Jumpman can make it. Each of the four bombs at the top is worth 500 points, so it is worth some practice to get them.

The major hazard on this board is the bullets. There are far more than on any previous board, but generally only one at a time. You can avoid them or jump over them; we find avoidance more reliable.

"Just as I thought—a nested loop."

8. Builder

Builder is the last board (whew!) of the beginner level. It is the first board with multiple bullets, and, for that reason, can be somewhat troublesome.

Start by jumping straight up, and then climb down the rope (it is the only way you can go). Clear the bottom two platforms in either a clockwise or counterclockwise direction. Getting these lower bombs will build the upper two levels and cause four additional bombs to appear.

Be careful making the jump at L; it is a long leap that sometimes results in Jumpman plunging to an untimely death.

9. Look Out Below

Look Out Below is a deceptively simple board, but one that can trip up (or squash) the unwary. Each time you take a bomb, a block drops from either the platform you are on or from one overhead. A given bomb always triggers the same block. Don't jump over the holes in the girders or the fallen blocks—simply walk or run over them.

If you follow our pattern, be sure to pause at the two places marked with a P to avoid falling blocks. When retrieving a bomb at the end of a platform, be sure just to barely touch it and turn around quickly; otherwise you get a bump on the noggin (and lose a life).

Watch the bullets. There aren't too many, but when you are at the edge of the board, all it takes is one with your name on it, and bang—you're dead.

10. Hot Foot

No one we know likes Hot Foot. Our pattern is one of the best ways to complete it—there are others—but it is not foolproof.

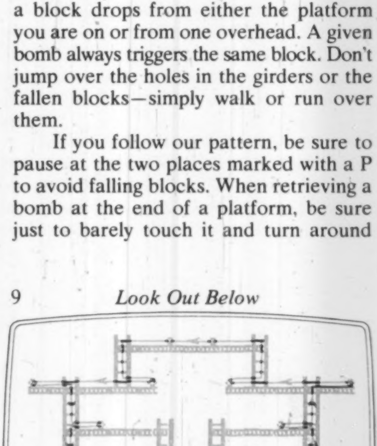
First head straight down before the bullets start flying—there are lots of them on this board. Jump over the bomb closest to the center ladder. If you retrieve it, blocks will cover the outside bomb making it impossible to get. Retrieve the outside bomb, then get the one closer to the center. Then jump the pile of rubble to get to the ladder. Inevitably, you will land on the side of the ladder. To recover, you must jump straight up until you land on the bottom platform, then move squarely under the ladder and climb it.

Follow the pattern, and the top right bomb (M) will widen the center platform so you can jump to it. Now pick up the top bombs, climb down again, and repeat the procedure on the bottom right. This time when you climb up, go to the center (you will have to as a piece will be missing from the center section of the ladder).

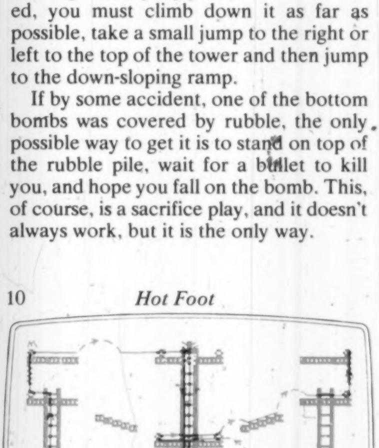
Retrieving the pieces on the center platform will build two small towers next to the center ladder. These are climbing (up only) towers. In general they are hazards, except if you were killed by a bullet and need to get to a lower side bomb (N or P). Since the center ladder disintegrates rapidly and can't be descended, you must climb down it as far as possible, take a small jump to the right or left to the top of the tower and then jump to the down-sloping ramp.

If by some accident, one of the bottom bombs was covered by rubble, the only possible way to get it is to stand on top of the rubble pile, wait for a bullet to kill you, and hope you fall on the bomb. This, of course, is a sacrifice play, and it doesn't always work, but it is the only way.

9 *Look Out Below*



10 *Hot Foot*



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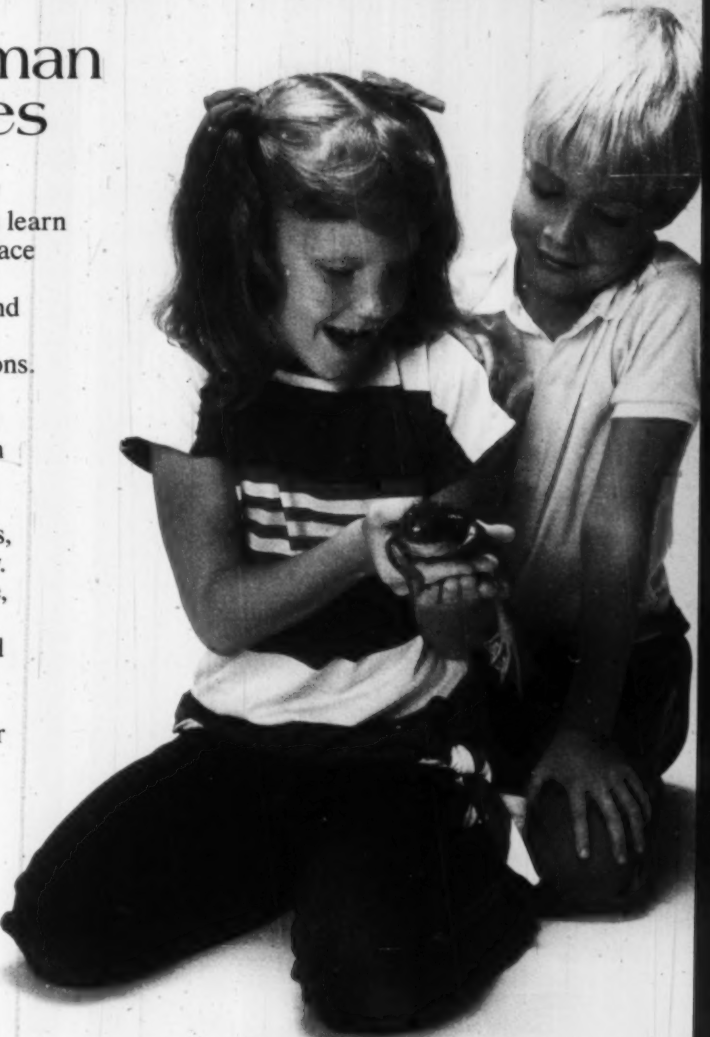

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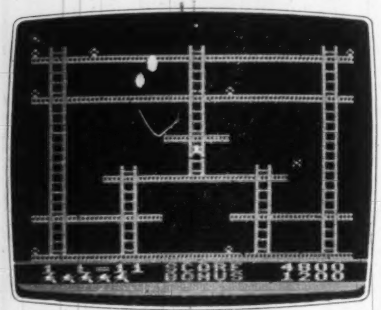
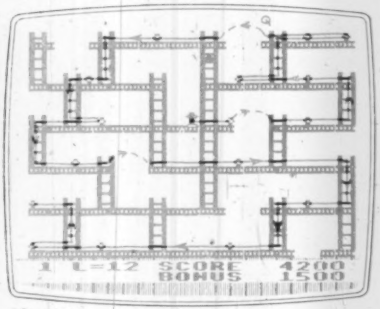
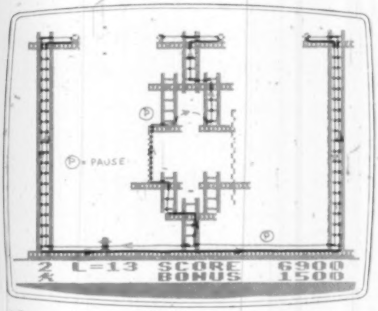


11 *Runaway*



12 *Robots II*



13 *Hailstones*

11. Runaway

Bullets, bullets, bullets. They fly fast and furious on this board. On Runaway, the bombs move about and you have to catch them any way you can.

Since the bombs move faster than you do, you have to get them when they are standing still or, better yet, anticipate their moves. In general, if a bomb moves off the side of the board (top, bottom, or either side), it will reappear on the other side or at the point from which it departed.

Since the bullets fly so fast on this board, it is worth your while to stay away from the edges. The side ladders are lethal; stay off them at all costs. The top platform is bad news too; avoid it if possible. Stick to the center area of the board where you can see the approaching bullets and take evasive action or, if you want, jump over them.

12. Robots II

The robots on this board are considerably more tenacious and nasty than the friendly little guys on Robots I. Nevertheless, they are dull-witted and can be outsmarted, if not outrun.

Follow our pattern carefully. Don't make the jump at point Q until the gray robot (the nastiest one) starts down the center ladder.

When you get down to the bottom level, depending upon your timing, one of three situations will exist. The first (and best) situation is that all three robots are dashing around on the top three levels; in this case just finish the pattern.

Another possibility is that some of them are fairly near you. Again, go ahead with the pattern—they will get out of your way.

The third situation occurs if you dilly dallied along the route and all three robots are homing in on the bottom right corner. Don't panic! By jumping the two gaps in the bottom right area of the board, and possibly going back to the third level, you can usually get away from the critters and finish the board. Remember, the robots can't jump, so you can generally escape to a platform that is safe by making a jump.

FAIRY TALES
campbell.

"...*and the princess dreamed of her knight in shining armor...*"

13. Hailstones

Hailstones is not a lucky 13 board—everyone hates it. No pattern is absolutely foolproof, but ours is the result of many hours of experimentation by many players.

As the board scrolls into view, jam the joystick to the left, and get Jumpman up that left ladder as fast as you can. Get the bomb and come down. Four hailstones will be following closely.

At the bottom immediately run to the right ladder, up to the top and retrieve that bomb. Down again and run to the left to a point between the center and right platforms. Wait for four hailstones to appear from the top and then dash to the center structure and up the left side. Stop at the top of the rope ladder until four hailstones drop. Just before a hailstone is about to kill you, jump to the right, head up the ladder, and get the bombs before the hailstones hit the ground and more appear.

In general, hailstones fall in groups of four, but sometimes they appear in smaller groups. Groups of four closely spaced stones are the easiest with which to deal; the smaller groups are murder. There are never more than four hailstones on the screen. As soon as one hits the ground, another falls from above—at exactly the point at which Jumpman was when the last one hit the ground. Hailstones usually bounce off the rungs of the ladders; Jumpman is usually safe on a ladder except on the top three rungs.

Don't be discouraged if you lose four or five lives on this screen at first—and even after you are an accomplished player. It is a tough one!

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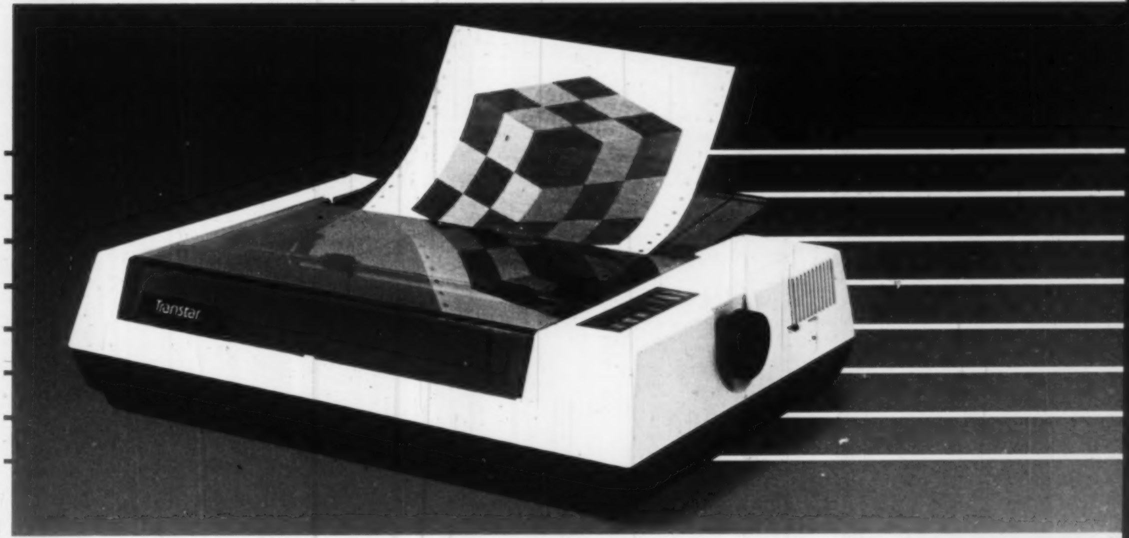

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14. Dragon Slayer

Like Invasion, on the Dragon Slayer board, you must collect only one bomb—at the lower left. You can't use the ropes; they are reserved for the dragons. On the way down, you can slay dragons for 50 points each.

You slay a dragon by pointing your joystick to the right or left and pressing the button. That releases your spear and, assuming your timing is correct, the dragon dies. But once one dies, another is reincarnated at the lower left and heads on up to breathe dragon fire upon you. So how do you get past this never-ending onslaught of dragons?

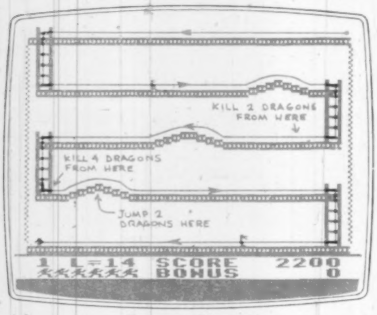
When the board opens, run left, down, right, down, and stand still. A dragon will be approaching. Kill it. (Practice a few spear throws so you know how far it goes, and don't forget to take into account the time the spear is in the air.) Kill the second dragon, which is close behind.

Run left and down to the second level. From the base of the ladder, kill the next four dragons. The next two should be spaced much closer together than the earlier ones. Stand on top of the mound and jump straight up when the dragon runs by. Do the same for the next dragon. Then run left (you should be just a bit behind the dragon one level overhead). Go down the ladder and to the left, and the bomb is yours.

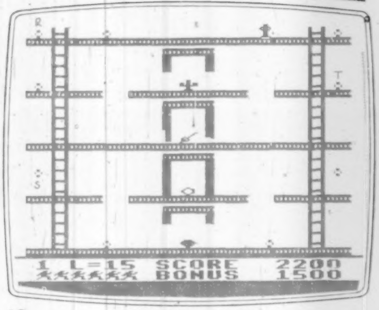
Several cautions: you cannot jump the dragons when you are moving; trying to do so merely launches a spear. While you can jump a dragon on level ground, it is much easier to do so while standing on a mound. As you kill dragons, the mounds start to flatten out until all the platforms are perfectly flat. This is trouble. Try to get to the bottom before this happens.

A Few Hints

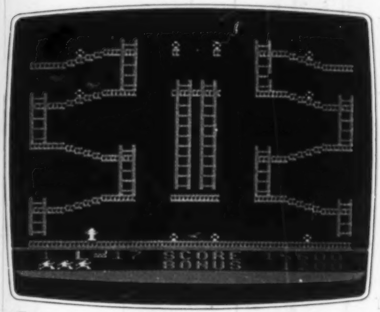
From here on, we are not going to give you patterns for the remaining 16 boards. In the first place, we haven't figured all of them out; in the second, we don't have space in the magazine; and in the third, we don't want to deprive you of the fun of figuring them out for yourself.



14 *Dragon Slayer*



15 *Grand Puzzle II*



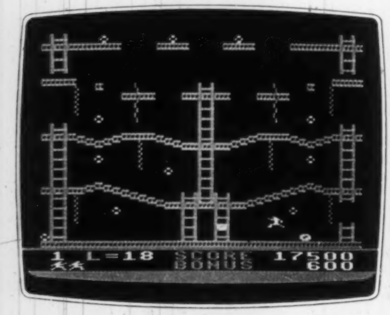
17 *The Roost*

However, just to get you started on some of the trickier boards, here are a few hints.

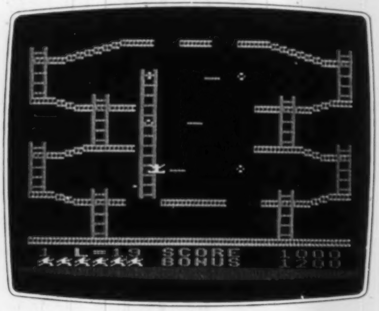
On Grand Puzzle II (15), the bomb at the top left (R) drops a rope into the top center treasure box so you can get out once you get the treasure. To get the bottom treasure, you must get bomb(S) or (T) first. Either one makes you invisible. Climb down (by feel), jump the bomb on the bottom platform, and run through the treasure cage to get it. As in Grand Puzzle I, the board ends when four bombs are left.

On The Roost (17), immediately climb up a step or two on the left ladder, then back down and clear the bottom platform

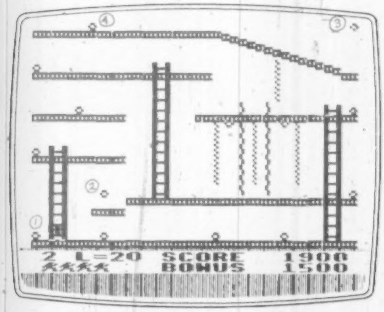
18 *Roll Me Over*

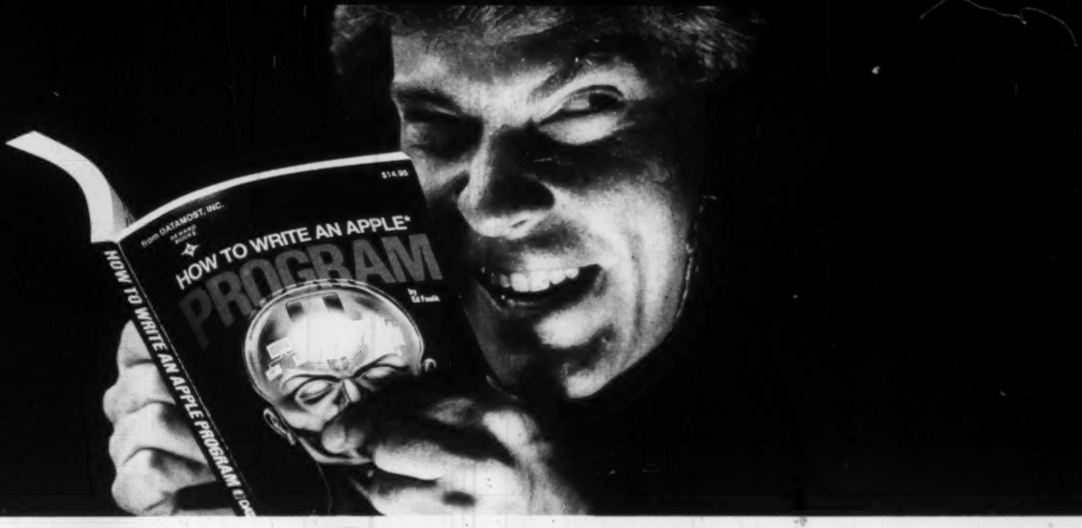


19 *Ladder Challenge*



20 *Figurit*

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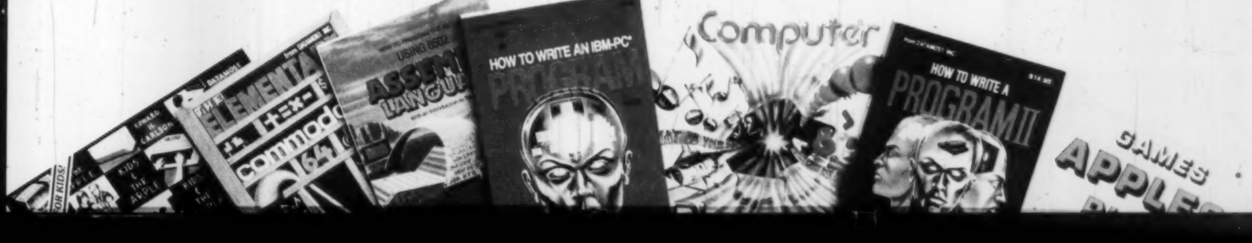
CIRCLE 145 ON READER SERVICE CARD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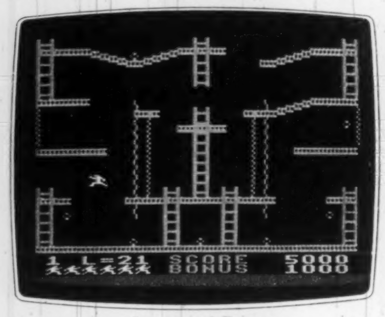
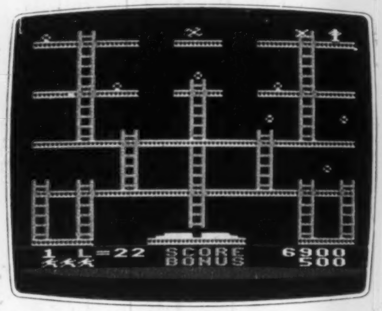
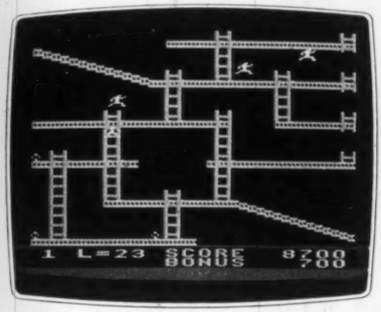

1 L=21 SCORE 5000
BONUS 1000

21 *Jump and Run*


1 L=22 SCORE 6900
BONUS 500

22 *Freeze*

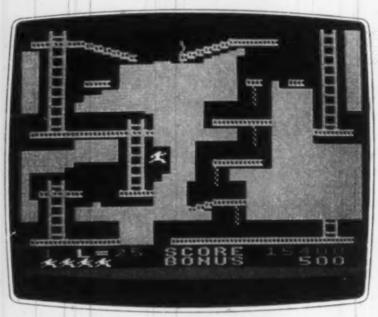

1 L=23 SCORE 8700
BONUS 700

23 *Follow the Leader*

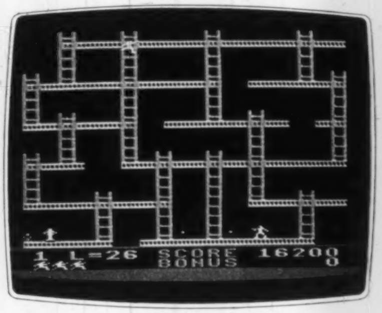
before those mad birds reappear at the bottom. The two top side bombs cause two others to appear at the bottom two corners. Vampires you can jump, but these birds are tough—stay out of their way if possible.

On Figurit (20), we have shown the first part of a pattern. Picking up these bombs in any other order makes it much more difficult, if not impossible, to finish the board.

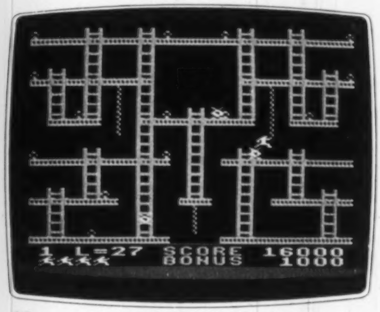
On Follow The Leader (23), cruise back and forth along the lower part of the ramp for a l-o-n-g time before taking the first bomb. Your followers will do the same which will give you a chance to clear the rest of the board. Beware: the ladders at the lower left lose pieces which can put you into awkward situations.


1 L=25 SCORE 15400
BONUS 500

25 *Mystery Maze*


1 L=26 SCORE 16200
BONUS 0

26 *Gunfighter*


1 L=27 SCORE 16000
BONUS 1000

27 *Robots III*

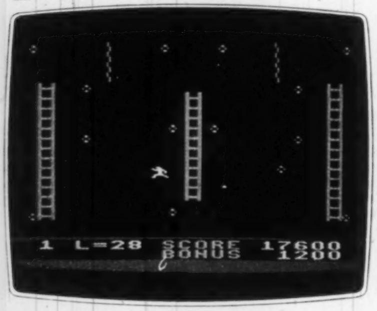
On Mystery Maze (25), there are actually two mazes that start out the same. We have included an illustration of a portion of just one of the mazes.

On Gunfighter (26), gravity is 23 times normal and you can't jump. We usually don't worry about extra points here, just hurry to the bottom and finish the screen.

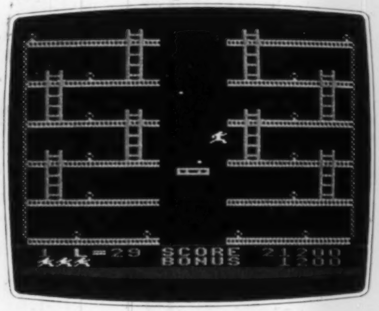
In Now You See It (28), as you grab various bombs, parts of the maze, or bombs, or both disappear and reappear. In addition, some of the bombs cause portions of the platforms to drop away. So as not to spoil it for you, our illustration shows only the ladders.

Good luck, and may all your leaps be successful! END

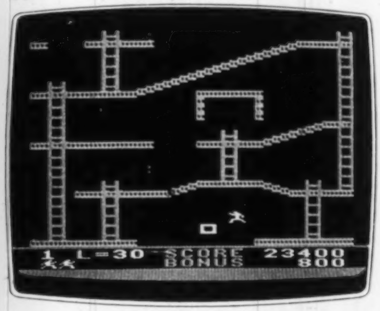
28 *Now You See It*


1 L=28 SCORE 17600
BONUS 1200

29 *Going Down*


1 L=29 SCORE 21200
BONUS 1200

30 *Grand Puzzle III*


1 L=30 SCORE 23400
BONUS 800

This Christmas, Atari and Commodore* owners will go out of their minds.

It'll take about 30 seconds.

Because once you boot a Datamost game on your Atari home computer, or your Commodore 64, you'll come face to screen with the most mind-blasting games ever.

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Our Music Will Have You Hearing Things.

Going out of your mind never sounded so good.

Because now our games have music. You heard right. Music. Original Music. Throughout. And scored just for our newest releases. You'll go nuts over it.

Our Graphics Will Have You Seeing Things.

You and everybody else.

Because our games are so great-how great are they?–they're so great you'll want to play them again and again and again. And then your friends will go bonkers over them. And they'll want to play. And then your family will want to play. And then total strangers off the street will want to play and…

Mind-blowing arcade-quality action like this makes it one mad world, pal.

We'll Torment You Right From The Start.

No time to settle down and get comfy.

The tension begins building the moment you boot the game.

Terrific screen titles tease you with the game's objective, scenario, characters.

And while you wait, hand twitching over the Joystick, you'll find out what planet you're on.

What the fuss is all about.

Why you're involved. And perhaps of singular importance to you personally, how to keep from being obliterated. So get ready to get the most out of your mind.

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THE TAIL OF BETA LYRAE.™ Changes as you play. Unpredictable. Impossible to master. (No one has!)

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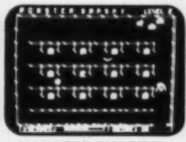
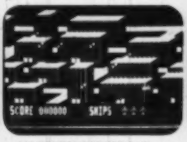


MONSTER SMASH.™ Deathly strategy. Mash the monsters! Let the visitors live.



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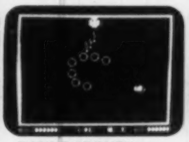

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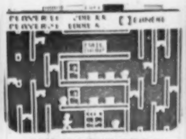

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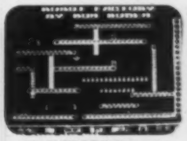

MR. ROBOT.™ Screens scream with color, action and sound! Design your own screens, too.

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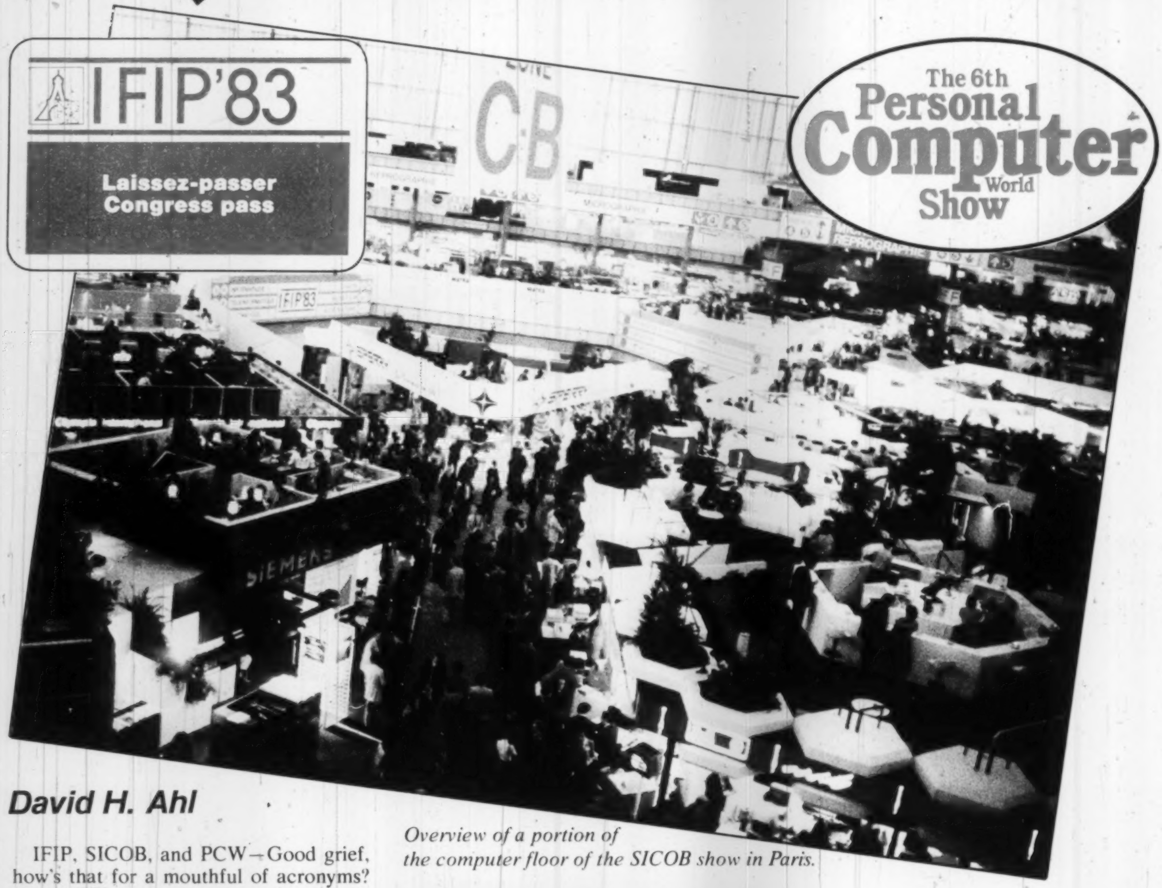
IFIP, SICOB, and PCW



David H. Ahl

Overview of a portion of the computer floor of the SICOB show in Paris.

IFIP, SICOB, and PCW—Good grief, how's that for a mouthful of acronyms? Yet, from September 19 to October 3, 1983 they assumed real meaning and dimension.

IFIP '83

IFIP, the International Federation for Information Processing, is a federation of the data processing societies of 43 nations. It exists to promote the spread of information science and technology, to advance international cooperation, and to further the dissemination of knowledge.

IFIP holds an international congress every three years; the ninth such congress was held in Paris from September 19 to 23, 1983.

Since it was practically back to back with the PCW show in London, we decided to go to both, although normally IFIP is not in our mainstream of interest. Why not? Two reasons.

TOILETTES
McGraw Hill

The McGraw Hill booth at SICOB was in an appropriate location.

IFIP focuses on ten areas such as Theoretical Foundations of Information Processing, Application Systems, and Database Systems. Most have more to do with the inside of the computer than the human interface. Moreover, the presentations in the two areas of interest to us—Social and Economic Implications and Computers in Everyday Life—tended to be theoretical and out of date.

We weren't alone in feeling a lack of relevance. Ken Brumbaugh of MECC mentioned to us that he found it difficult to find a common ground for meaningful discussions of computers in education when educators at the show talked in terms of having one computer at a school to service 1000 students or so. He also felt that a panel discussion which gave each of nine educators just ten minutes to state their

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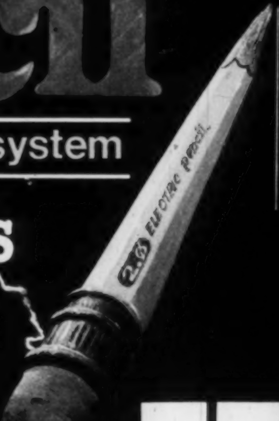

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It's also the easiest to learn—it must be because so many bootleg copies exist without documentation. It's the only word processor with a totaly integrated dictionary and automatic spelling correction add-on package. If you think this is a lot of B.S., just ask a Pencil user.

H.C. Pennington

H.C. Pennington, President

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position and views did not encourage any depth in presentations or discussions. Two professors from UCLA agreed with Ken on the lack of vitality in the presentations.

We were especially disappointed in the computer art presentations. In contrast to Siggraph, the demonstrations were a real disappointment, and more and more people left after each successive speaker.

So what does IFIP have to offer? Presumably for the DP professional, particularly in a less developed nation, it has more to offer than to a personal computing enthusiast in the U.S. But perhaps the main reason for attending was that mentioned to us by Stan Winkler—the camaraderie, the renewing of old friendships, the making of new friends, and the informal sharing of ideas. Certainly for us, that was far more worthwhile than all the presentations on systolic VLSI arrays, ultra parallel microprocessor design, and the danger that computers pose to our privacy.

Demonstrations of Lisa were attracting a great deal of attention at the Apple booth at SICOB.

SICOB

SICOB is a French acronym for an international trade show for data processing, telematics, communications, office organization, and office automation. It is an immense show, the largest of its kind in Europe, covering 850,000 square feet with an attendance of well over 400,000.

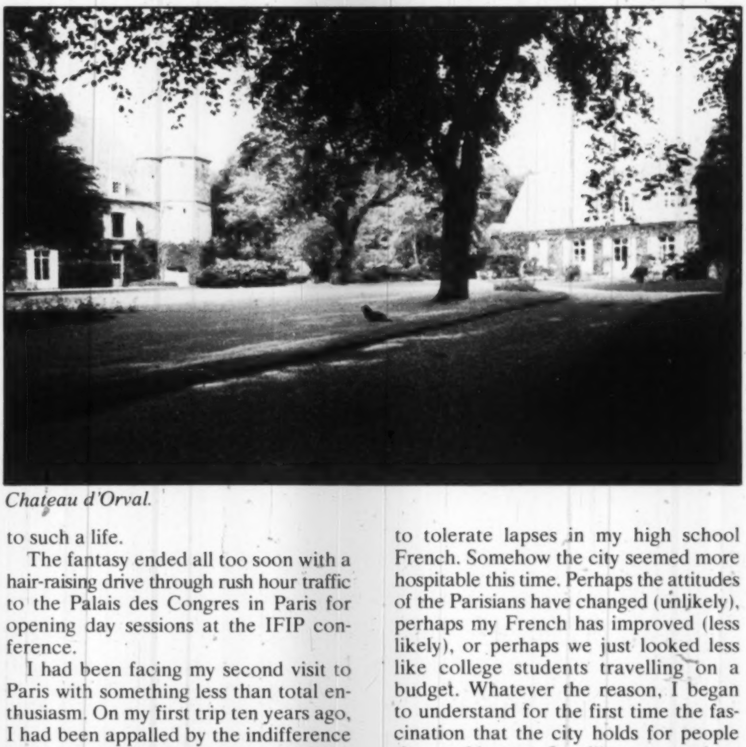
As with IFIP, there was not a great deal of interest to us at SICOB. Several small computers were being shown which are not currently available in the U.S. We got a closer look at the **Canon** X-07 and a chance to use the real thing rather than the prototype we saw at CES.

Paris To London: People & Places

Betsy Staples

When long-time friend and contributor Ancellme Roichel called to ask us to spend the weekend prior to the IFIP conference at his "family chateau" near Paris, we had no idea what to expect. We know Ancellme as a pioneer in personal computing whose ideas and experiments frequently anticipate the direction of technology by several years, but he never struck us as the sort of person who would be associated with a chateau—family or otherwise.

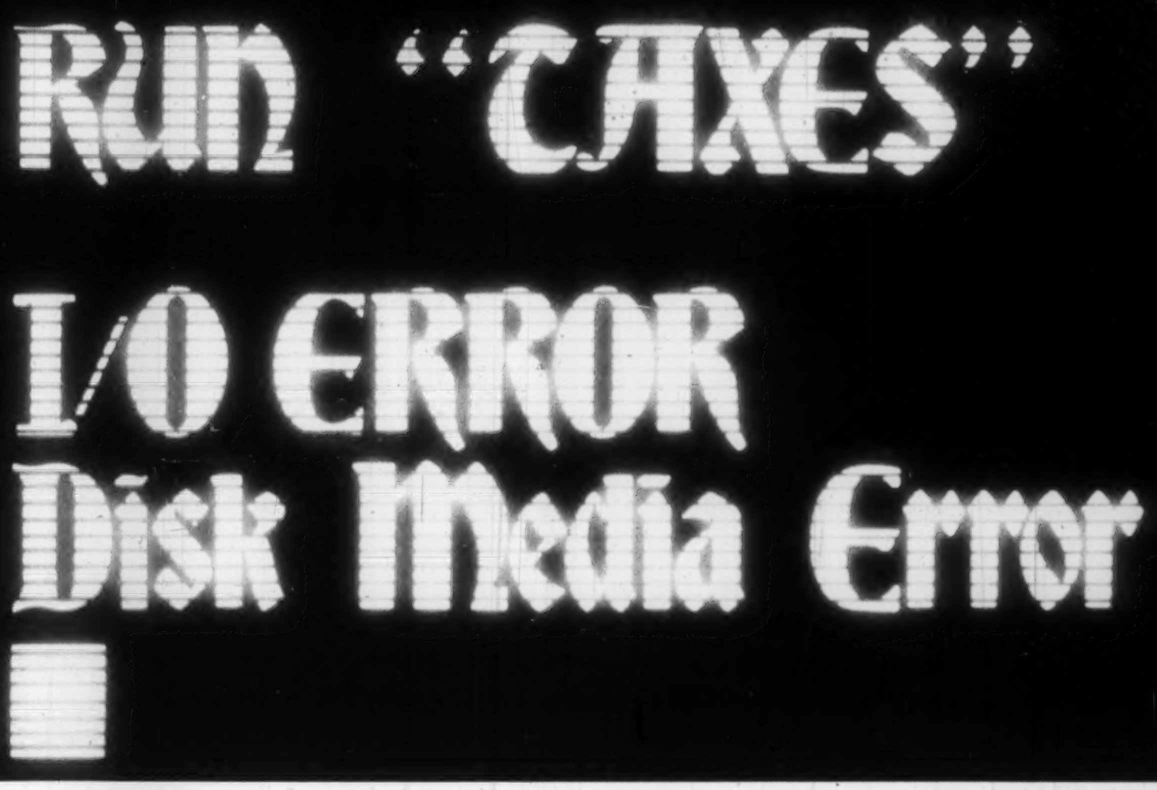
Imagine, then, our surprise when Ancellme drove his rented car through the gate of a genuine French chateau, parts of which date from the 16th century. Furnished with Oriental rugs, antique Chinese porcelain, and ancient Middle Eastern ceramics and tended by helpful, friendly servants, Chateau d'Orval made us feel like characters in a Masterpiece Theatre production. We agreed that it wouldn't take long to become accustomed to such a life.



Chateau d'Orval.

The fantasy ended all too soon with a hair-raising drive through rush hour traffic to the Palais des Congres in Paris for opening day sessions at the IFIP conference.

I had been facing my second visit to Paris with something less than total enthusiasm. On my first trip ten years ago, I had been appalled by the indifference of the people and their complete inability to tolerate lapses in my high school French. Somehow the city seemed more hospitable this time. Perhaps the attitudes of the Parisians have changed (unlikely), perhaps my French has improved (less likely), or perhaps we just looked less like college students travelling on a budget. Whatever the reason, I began to understand for the first time the fascination that the city holds for people the world over. It will never replace



RUN "TAXES"

I/O ERROR
Disk Media Error

A Modern Day Fable.

Once upon a time there was a very diligent man, Jack. Every year the man promised his very faithful wife that he would keep accurate records to make tax time more bearable.

One sunny day, Jack traded in his family cow for a new computer. That starry night, he began to enter all of his tax records onto disk. "How easy and accurate this will be," he stated.

The months went by. Tax time approached. Confidently, Jack inserted his data file and entered "Run Taxes." "Just watch," he said to his wife. But alas. His CRT, as if it were alive, proclaimed, "I/O ERROR." "Gads," he stammered in frustration. "Oh my," said his wife.

Then entered his neighbor carrying three beans, a golden lyre and the new Discwasher® Clean Runner™ Interactive Drive Cleaner. The good neighbor told Jack, "Preventive maintenance will destroy dirt in the disk drive and keep it running clean."

The good neighbor promptly inserted the Clean Runner Interactive Drive Cleaner into the drive and cleaned the read/write heads for Jack. Saying "Bye," he left to tend to his garden. Diligent Jack then proceeded to run his tax data and this time all went well.

The moral of the story, Discwasher Clean Runner is a disk of prevention for a bit of frustration.

The End.

Not all endings are that happy. A dirty read/write head can cost not only many hours of time but also the loss of valuable data.

- *Discwasher® Clean Runner™ Interactive Drive Cleaner is one disk that contains both the program software and the cleaning surface. There is no program to enter.*
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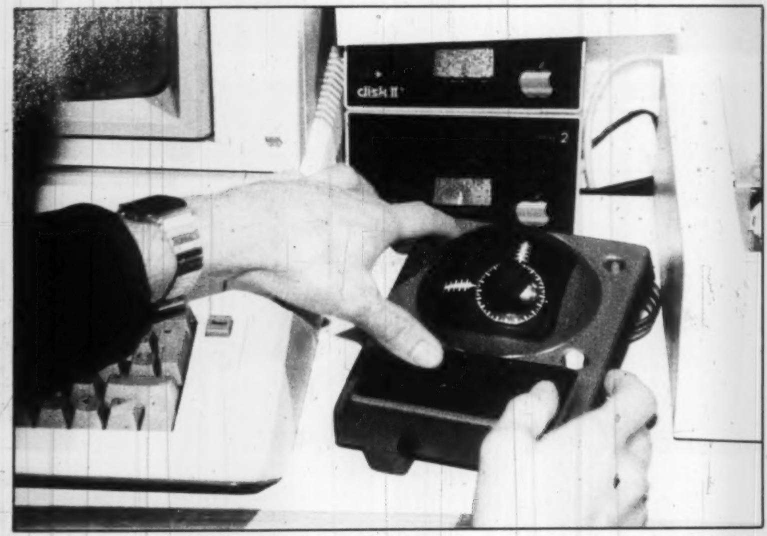

The Robo Stick is an accurate input controller for the Apple, Acorn, and other computers.

It falls into the category of a notebook computer—it is smaller than a Model 100 but larger than a pocket computer. The keyboard is laid out in conventional QWERTY fashion, but the keys are calculator style and spaced more closely than on a standard typewriter. However, they do have a good feel, and we got no keybounce whatsoever in normal use. In our benchmark test, the X-07 was quite slow, but provided reasonable accuracy. We were quoted a price of "under 1000 francs" ($125), but we have reason to believe that is way too low. Canon USA isn't talking.

Another small machine we saw previously at CES is the **Sanyo** PHC-25. It is a nifty low end computer, although incredibly slow. We were told it would not be marketed in the U.S. because of the cutthroat price competition at that end of the market. It seems that that sort of kamikaze competition hasn't spread to Europe—at least not yet.

Surprisingly, we saw very few portable machines of the Osborne variety. Most of the European business entries seem to be more along the line of the IBM PC, at least in physical appearance.

Apple was getting a great deal of attention at their Lisa demonstration, although we found a marvelous new graphics entry device on another part of their stand (booth). It is manufactured by **Robocom** in England and is a cross between a joystick and track ball. A stick projects out of a calibrated ball and we found it much easier to maneuver the cursor accurately around the screen with this device than any joystick or mouse. We hope that either Robocom or Apple decides to market the device in the U.S. The supporting graphics software was quite amazing too.

Paris from the 14th floor.

The predominant sight is sheep.

London in my affections, but it has risen to a position somewhere above New York on my list of enjoyable cities to visit.

On To Wales

Having had our plans to visit Belgium and Holland foiled by a general rail strike in Belgium, we revised our itinerary and headed for Wales with the assistance of British Rail's SeaLink.

The predominant color in Wales is green—a lush, moist green that I have never seen in the U.S.—and the predominant sight is sheep. Wool is big business in Wales, where even the smallest patches of unoccupied ground are expected to support at least a sheep or two.

We rented a car in Cardiff and spent the first night in the delightful seaside resort of Mumbles, which featured a giant rainbow striped apple on the side of one of its most prominent buildings. Apparently, delightful seaside resorts are not prime locations for computer stores, because the shop below the apple had been abandoned.

The Welsh people are, if anything, more cordial and helpful than the English. Most were happy to chat and eager to volunteer advice and information. Perhaps the most interesting bit of information we picked up was from the proprietor of a craft shop who told us about the frog migrations in his area. "In the spring," he said, "people join the Frog Patrols to help the frogs cross the roads and get to their mating places safely." We found this concern for such lowly creatures admirable. Kermit notwithstanding, we suspect that a similar situation in this country would result in either very hazardous driving conditions or the installation of teeny, tiny DON'T WALK signs on the highways.

The only place we heard Welsh spoken was on the Welsh TV station, but the place names presented sufficient chal-

THANKS

We gratefully acknowledge the many positive comments that we have received in response to **Chess 7.0, Checkers 2.1,** and **Odin.**

Chess 7.0 – Then and Now

In 1982, we introduced **Chess 7.0**, by Larry Atkin. For the first time, the chess player could save games to disk, take back moves easily, learn from classic games, use a **real** manual, enjoy an extensive opening library, fast play, a smart end-game, and in general work with a program **designed** to extend his or her own reach. **Chess 7.0** also played better than any other chess disk on the market. And although other programs are now beginning to offer some of **Chess 7.0's** features, **Chess 7.0** is still, by far, **the** learning, analytical tool for the chess person. Decide for yourself – ask your dealer to show you the interactive chess game where you get better, not bored.

Announcing New Versions

Chess 7.0, Checkers 2.1, and Odin are now available for the **IBM PC** and **Commodore 64**. Thanks for waiting.

More Feedback

From Neil Shapiro, Popular Mechanics "PM Software Monitor" 5/83. "The Best in Chess ... all the options make playing a game with **Chess 7.0** more like having a conversation with a chess teacher than playing against a machine."

From Jonathan Cerf, former World Othello* champion "... an extremely formidable opponent – in most situations, **Odin's** play is world class by human standards." Othello Quarterly, summer '83.

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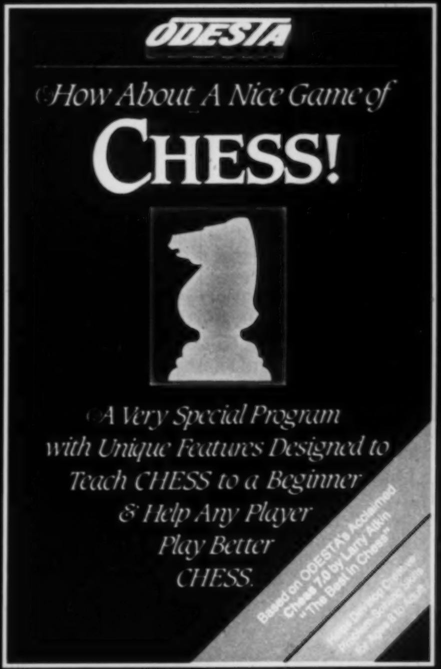
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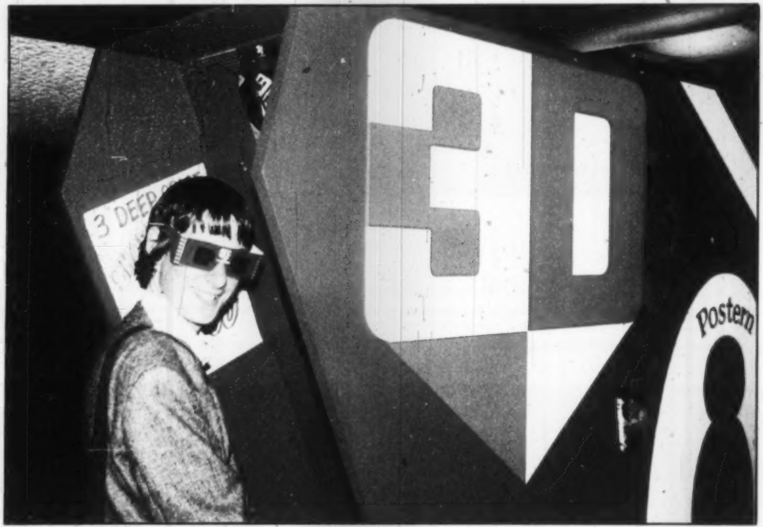
PCW Show

PCW stands for *Personal Computer World* magazine. According to the cover, it is "Britain's Biggest Microcomputer Magazine." It has undergone the usual changes in ownership, common in the field, and is now owned by VNU. Under the previous owner, it was informally our sister publication, but that relationship no longer exists.

In any event, PCW has been sponsoring a personal computing show for six years, and we have been attending for four. It is the largest show of its kind in England, and generally a great deal of fun.

However, as with other shows, the effects of dilution are beginning to show. Today, there are so many shows, so many stores, and such widespread availability of hardware, software, and books, that the frantic activity (read *buying*) of previous years was largely absent. Also, the show was held over five days, so the activity was more widely dispersed. Not that it wasn't busy on Saturday—it was. So much so, that the narrow aisles of the Barbican Center were crowded to the point that movement was totally impossible in many places. Those, of course, tended to be around the stands exhibiting the most interesting new products. More about those later.



Players of Postern Ltd.'s 3-D games donned special goggles.

Some general observations: Britain has its own well-established computer industry, and there were fewer American machines on the floor than in any previous year. Apple was conspicuous by its absence; not only did Apple not have a stand, but very few peripherals and software packages were being shown for the Apple. Atari and Commodore both had large stands, but far more space, particularly among peripheral and software vendors, was devoted [illegible] the Sinclair Spectrum, Dragon, and A[illegible]n BBC computer.

lenge to keep us on our linguistic toes. Imagine the scene: Rented car approaches roundabout. Driver, all the while trying to remember which side of the road he belongs on, calls to navigator, "Do we want to go to Llanrhaeadr or Llanwrtyd?" Navigator replies, "I can't find anything that sounds like that on the map. Can you spell it?" By this time, they have missed the turns for both towns and are zipping along toward Penrhyndeudraeth.

London Update

Back in London, we noticed that the showers have not improved and phone sanitizing is still a booming business. Friends were quick to inform us that telephone service has improved greatly. They claim that public telephones now not only make change, but accept your payment before the called party answers so that you have a chance of actually completing the call. We have no reason to doubt the accuracy of these reports, but all the public phones that we saw and used were of the old answer first, then pay variety.

We were pleased to discover Tim Hartnell alive and well and writing in Shepard's Bush. Much to his consternation, a recent issue of *SYNC* magazine reported Tim's retirement. He has been travelling in Australia signing up new book authors and plans to publish something like 42 new books this year—hardly a retirement schedule.

Other people who have not retired are former *PCW* editorial staffers Peter Rodwell, Maggie Burton, and David Tebbutt all of whom are now engaged in independent ventures but remain involved in various projects of the magazine and its offspring. They treated us to dinners at their respective homes that dispelled any evil notions we might have had about English food.

The Apple logo dominates downtown Mumbles.

People at the PCW Show kept telling us that the Sinclair ZX81 was dead in England, and we began to believe them as we watched the Sinclair-oriented books and magazines languish on the shelves of our stand. On the last day of the show, wanting desperately not to have to store them for another year, we put on our marketing hats and made a large poster: ZX81 Owners—Ask for Free Gift. Suddenly the hall seemed to be filled with ZX81 owners, and we were able to dispose of all the material we had in a few hours. We concluded that ZX81 owners are not dead, just impoverished or under age.

We also concluded that this would be our last year to exhibit at the PCW Show. Like the shows in this country, PCW will soon be the domain of large manufacturers who neither need nor expect to recoup the expense of exhibiting from sales at the show. We predict that fewer and fewer small companies and companies with relatively low cost products will be able to afford any but the smallest shows and flea markets.

We will, however, continue to cover the show (and environs) editorially to keep you up to date on the market wherever it may be.

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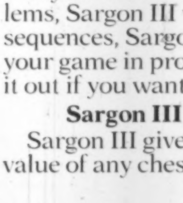

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HAYDEN SOFTWARE

CIRCLE 160 ON READER SERVICE CARD

The Commodore stand was crowded, but had no new products on display.

The Creative Computing booth at the PCW show was colorful and, during show hours, packed to the gills.

Sharp was showing yet another updated version of the MK-60, this one numbered MZ-700. It has nice specs, and the version with the built-in four-color printer/plotter is very nice indeed. However, as with the earlier versions, the MZ-700 is cassette-oriented (only), and "high resolution" graphics must be done with graphics symbols within a 40 x 25 character matrix.

We were interested to see that **Mattel** was making a big push for the Aquarius computer, Intellivision, and their noisy Synsonics drums. Perhaps they are hoping for success in the U.K. with products shunned by the American market.

Among the business machines, the Apricot was attracting the most attention with the Sirius 1 and IBM PC not far behind. The Pied Piper, introduced at the show, seemed to be well-received, as was the NEC 8800, DEC line, and Seiko 8600. This latter machine is a 16-bit 8086-based computer with 128K, 640K floppy disk drive, 10M or 20M hard disks, that runs MS-DOS, CP/M, or any one of four multi-user operating systems.

Elan Computers

Elan, a company started by David Levy of computer chess fame, was showing an early prototype of a powerful computer designed to sell in the $300 range. David made the point that this may be the first machine designed by a software company; thus it incorporates many features of interest to software designers and programmers.

> **Among the business machines, the Apricot was attracting the most attention with the Sirius 1 and IBM PC not far behind.**

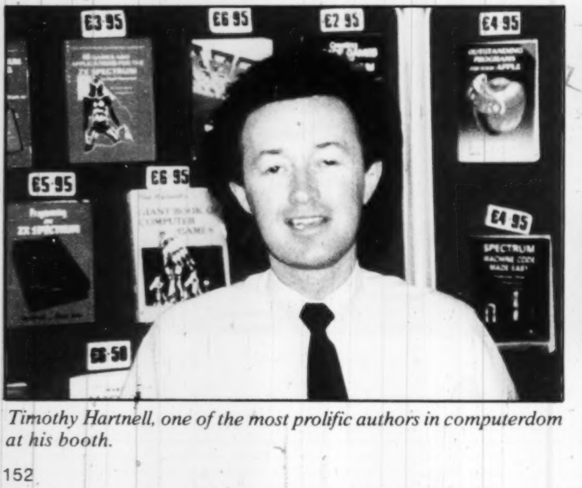
Briefly, it is built around a Z80A (4 MHz) with 32K of ROM and 64K or 128K of RAM, expandable through a memory management system to a staggering 3.9Mb. The graphics resolution is 672 x 512 pixels; text resolution is 56 lines x 80 columns (84 if the border area is used). The Elan employs 68 full-stroke keys and a built-in joystick (like the SpectraVideo 318). Sound capability includes four voices over eight octaves via stereo output. Many of these capabilities are produced with custom chips, so we are not likely to see them in other machines—at least not immediately.

Elan is seeking an American partner, and we expect to see them busily writing orders at the winter CES in Las Vegas.

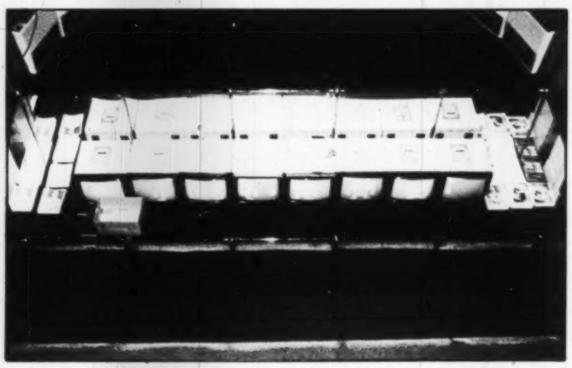
For more information, write Elan Computers Ltd., 31-37 Hoxton St., London N1 6NJ, England.

ACT Apricot

We were frankly astonished at the interest in the Apricot. Not only did ACT have a huge stand, but many software



Timothy Hartnell, one of the most prolific authors in computerdom at his booth.



At the Acorn booth, here viewed from above, most of the BBC and Atom computers were tied into a central hard disk controller. Here, eight of the machines are running continuous graphics in a horizontally scrolling banner.

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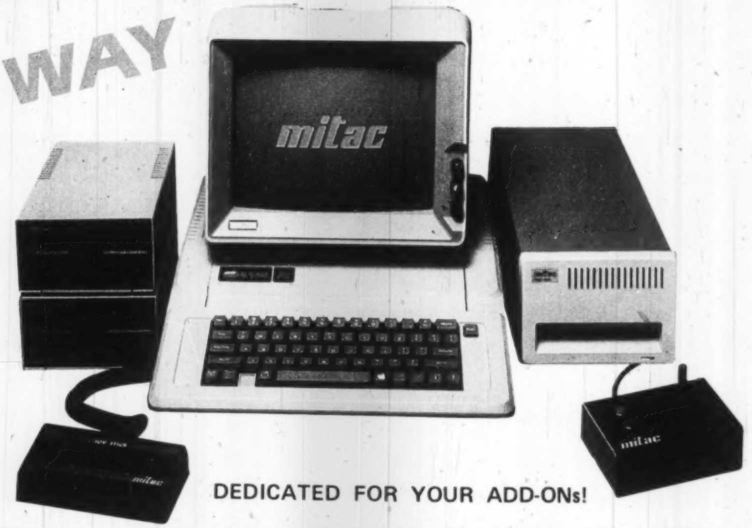

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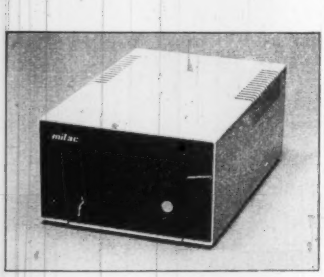
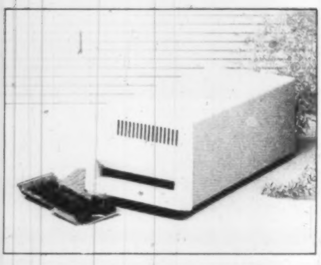


AD-1 is the most reliable and the most costeffective add-on floppy disk drive for Apple II[1], II PLUS[1] and IIe[1] computers. It matches them in quality and function but at less cost to you. There's no need for any software modifications.



AD-50/100 are series of add-on 5¼" 5MB/10MB Winchester disk drives for Apple II or IBM PC② computers. AD-50/100 incorporate microprocessor-based architecture, proven Winchester technology and built-in hardware ECC capability to detect and automatically correct errors.

TM-1265 features 12" nonglare green/amber screen, 10 degrees tiltability, 800 lines horizontal high resolution, elegant outerlook and easily accessible modules on a light weight but sturdy plastic frame that eases eyes strain and is easy to maintain.

MITAC is the largest computer system and peripheral engineering company in Taiwan, backed up by more than 200 computer engineers, most advanced CAD/CAM systems for designing and manufacturing and high-speed A.T.E. facilities for automatic testing. Besides, we are the third licensed manufacturer of disk drives from Shugart next to IBM and Matsushita in Japan.

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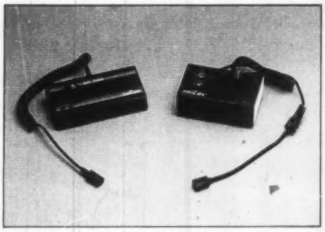

JOY-80/100 are joysticks with microswitch technology to ensure high accuracy, super sensitivity, and autocentering feature to ease operations. With micro adjustment capability, JOY-100 lets you adjust the cursor center on the right position as you wish.

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AD-50A	V		5MB
AD-100A	V		10MB
AD-100I		V	10MB
JOY-80	V		–
JOY-100	V		–
TM-1265	V		–

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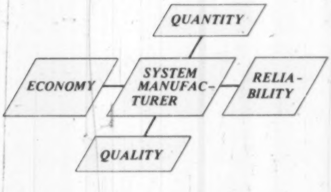

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CIRCLE 240 ON READER SERVICE CARD

Perhaps the strangest data entry device we have ever seen is the Microwriter.

manufacturers were showing packages for the machine as well.

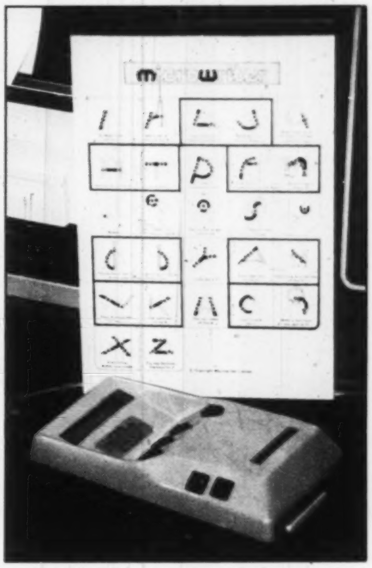
The Apricot is termed "the 4th Generation Executive Computer' and employs an 8086 (5 MHz), 256K expandable to 768K, one or two Sony microdrives, 9" screen with 80 characters x 25 lines (or 132 x 50) text resolution, and 800 x 400 pixel monochrome graphics resolution. Outwardly, it looks like a sleek IBM PC (systems box with drives, tilt-and-swivel monitor, and detached keyboard). It uses a second 8089 processor for memory management, and an optional 8087 is offered for math calculations.

Three operating systems are included: MS-DOS, CP/M-86, and Concurrent CP/M. Both Microsoft Basic and Digital Research Personal Basic are included, along with a range of applications software.

Prices start at around $2400. American availability is promised soon. Watch for a review on these pages. For more information, write ACT International Ltd., 111 Hagley Rd., Birmingham B16 8LB, England.

Microwriter

Perhaps the strangest data entry device we have ever seen is the Microwriter. Slightly larger than an adult hand, the device has six buttons (one for each finger and two for the thumb). These six keys simulate the functions of an entire alphanumeric keyboard.



Microwriter is an interesting, new data entry device.

Microwriter can be attached directly to a computer; however, it also has a built-in 1600-word memory and battery power.

Data entry on the Microwriter compared to a keyboard is like speedwriting is to handwriting. The photo shows how several letters would be entered on the Microwriter.

U.S. price is around $500. For more information, write Microwriter Ltd., 17 E. 71st St., New York, NY 10021.

Games, Games, Games

The casual visitor to the PCW show would be forgiven if he mistook it for a full-scale invasion of aliens, Pac-creatures, worms, trolls, frogs, mutants, and assorted noisy monsters. With the exception of a small business-oriented area of Hall B, manufacturers of games software were in every nook and cranny showing their wares. Moreover, there was no prohibition on sound levels, so each stand attempted to outdo its neighbor in decibels. The effect of all this, along with the noise of the crowds, was nearly overpowering.

Postern Ltd. was showing an interesting true 3-D game. The effect was achieved with special glasses with red and blue lenses supplied with the game, *3-Deep Space*. As with most suppliers, versions are available for the Spectrum, BBC computer, and Commodore 64. Watch for our review of the 64 version soon.

Another new concept in games was

A New Kind Of BBC Home Service

John Anderson

Over the past two years, the Acorn BBC micro has taken the British Isles by storm. As part of a national program to improve computer literacy throughout the United Kingdom, the British Broadcasting Company invited computer firms to compete for the assignment to develop a new educationally focused microcomputer that met high technical specifications.

The Acorn, designed by leading educators at Cambridge University, subsequently was chosen as the official BBC micro. Today more than 85% of English schools use the Acorn to teach computer literacy. In Britain, Acorn is selling units as fast as it can turn them out.

Now Acorn is introducing the BBC micro to the United States. At a press conference in New York City last week, the U.S. version of the machine was unveiled.

Built around a 2 MHz 6502 processor, the BBC Acorn comes with 32K RAM standard, expandable to 64K inboard. It includes alongside its ROM operating system a structured version of Basic and *View*, a ROM-based word processing system. Its 73 key QWERTY keyboard includes 10 user-definable function keys.

Also built-in to the hardware are a voice synthesis module and a three-voice synthesis module with full envelope control. The video display provides 40- or 80-column text, graphics resolution of up to 160 x 200 in sixteen colors, and 640 x 200 in two colors. Fully three video outputs are offered: NTSC color, monochrome monitor, and RGB color. The RGB output video quality is superlative.

Standard interfaces include floppy disk capability, a Centronics-compatible parallel printer port, an RS-432 serial interface, which is described as an enhanced RS-232, and four-channel analog to digital conversion.

In addition, the Econet interface allows up to 254 BBC Acorns to be inexpensively tied together into a single network. This feature will be of special interest to educators. Using Econet, an instructor may monitor the progress of an entire classroom of Acorn users. A single command allows a master station to view any other display tied to the network.

The external connection dubbed the Tube affords co-processor capability. A second 3 MHz 6502 module can be added, including an additional 64K. A Z80 module also includes an additional 64K and can support the CP/M operating system.

Looks like a Ferrari. Drives like a Rolls. Parks like a Beetle.

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The most advanced, most handsome disk drive in the world.

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And each GT comes with the exclusive *GT DrivingSystem*™ of software programs.* World-class word processing is a breeze with the *GT Estate WordProcessor*.™ And your dealer will describe the two additional programs that allow GT owners to accelerate their computer driving skills. *Included as standard equipment.

Also, the 1984 Indus GT is covered with the *GT PortaCase*.™ A stylish case that conveniently doubles as a 80-disk storage file.

Parks like a Beetle.
The GT's small, sleek, condensed size makes it easy to park.

And its low price makes it easy to buy. $449 for Atari. $329 for Apple.

So see and test drive the incredible new 1984 Indus GT at your nearest computer dealer soon.

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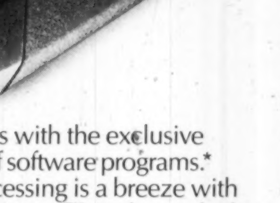

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CIRCLE 155 ON READER SERVICE CARD

being shown by **Phoenix Software**. They announced a series of action/adventure games. First, the player must master an action game. Upon completion of each level, he receives a clue for later use. After completing the highest skill level, the player gets the loading code for the adventure portion of the game, and play continues in the style of a normal text adventure. All in all, a novel concept. We'll review one soon.

Llamasoft, originators of the wonderful *Gridrunner* game (marketed in the U.S. by HES), were showing several new entries for the Spectrum, Vic-20, and CBM 64. One really wacky one goes by the name *Hover Bover* and requires the player to mow up to 16 lawns with a power mower borrowed from a neighbor. You can sic your dog on the pursuing neighbor, but you must avoid the busy gardener and not plow through the flowerbeds or overheat your mower.

Llamasoft were also showing *Matrix*, a sequel to *Gridrunner*; *Attack of the Mutant Camels*, similar to the Parker Brothers *Empire Strikes Back* VCS game; and *Laser Zone*, an original space shoot-'em-up in which the player must control two spaceships at once. It's not easy! Reviews coming up soon.

Quicksilva, the software of which you have read in *SYNC*, was showing several nifty CBM 64, BBC, and Spectrum games. In *Quintic Warrior*, an original arcade game, you must stand alone against the sinister Crabman and mangled mutants. Like water skiing? Try *Aquaplane* in which you face Marine Maniacs and other aquatic obstacles. Reviews soon.

Opportunity knocked

Adam Osborne, aged 44, founder of the newly-bankrupt Osborne Computer company remained uncharacteristically quiet yesterday declining all comments on his company's problems.

A former computer industry columnist and book publisher he is known for his bravado. Earlier this year he boasted that he would knock out his competitors with a new product he called a "cherry bomb." In the event the idea backfired.

The son of British missionaries in India, Osborne was educated in England. But he regards California as the land of opportunities.

"Here it is a question of what you know, not who you know. I would not have a chance in Britain," he says.

Well, he had his chance in California.

The British press was less than kind about the demise of Osborne Computer. Above is the report from *The Financial Times* of London.

Across the aisle from us, **Salamander Software** was attracting a good deal of attention with several games for the Dragon 32, most of which are also available for the Tandy Color Computer. We particularly liked *Dragon Trek*, a game in the tradition of the original Star Trek, and *Wizard War*, an original game of magical conflict between the wizards of an alien planet.

Salamander also had several excellent adventures including *Franklin's Tomb*, *Everest*, and *Lost in Space*.

Rabbit Software had some nice Vic-20 and CBM 64 games. Most were arcade look-alikes and copies of board games, but the graphics were interesting and well done.

Romik was a company launched at the 1982 PCW show. In the following year they became established as a first rate games producer. They were showing a wide range of games for CBM 64, Vic-20, Spectrum, and other machines. We were impressed with *Dicky's Diamonds*, a game in which Dicky the Owl has to retrieve diamonds stolen by Stephen the Spider by weakening his webs. Quite unique! Watch for a review. *Zappy Zooks* is a Pac-creature type of game, but wildly (impossibly?) challenging at the higher skill levels.

Audiogenic was showing several utility packages for the Vic-20 and CBM 64, including *Magpie*, a user-programmable database program with "pop-up" windows and menus. Several well-known arcade-type games of other vendors, as well as Audiogenic, were produced using Audiogenic graphics utilities.

COMPUTER
USER GUIDE
BBC
CHEMICAL ANALYSIS
LESSON PLAN

The BBC Acorn is slated to make a splash on this side of the Atlantic.

An NS16032 module brings 32-bit architecture to the Acorn, with the capacity to address up to 256K.

In addition to the many high quality educational packages currently available for the BBC Acorn, contractual agreements with many U.S. houses have been concluded to support the machine. Among these companies are Spinnaker, Muse, Micro-Ed, CDC (Plato series), and ISM. The range of software will span elementary through university level, and all packages will be reviewed by an advisory panel staffed by American educators.

As if all this weren't enough to get the machine off to a solid start in the U.S. educational market, two BBC television series underwritten by Acorn will air in the United States, prominently featuring the BBC micro. The first, aptly called "The Computer Programme," was shown last spring and will be rerun this season by 220 PBS stations. The second, "Making the Most of the Micros," will premiere later this season.

With the Acorn selling for less than $1000 in this country, it is bound to have a real impact on the educational market. As soon as a U.S. version of the unit arrives at the lab, you will see a comprehensive review in the pages of *Creative Computing*.

For more information, contact Acorn Computer, 400 Unicorn Park Dr., Woburn, MA 01801. (617) 935-1190.

IFIP, SICOB, PCW, continued...

Britain has beaten us by publishing the first computer comic, Load Runner.

Magazines

Personal Computer World, as any old-timer is aware, was modeled on *Creative Computing*. Even today, the two magazines and their respective offspring bear a striking resemblance to one another. Both have been acquired by large publishing empires. Both publish a Sinclair-specific magazine. Both publish a games magazine, a business computing magazine, buyer's guides, et cetera.

In many other respects,, the British computer magazine publishing industry parallels that in the United States. There are far more magazines than anyone might have imagined a year or two ago. Although we Americans pride ourselves on being first in nearly everything, Britain has beaten us by publishing the first computer comic, *Load Runner*. The comic/magazine carries six regular strips and several additional features and is aimed, as expected, at a young audience. One problem: their technical advice column, Brainy's Brainbox, regularly contains answers to readers' questions that are shallow and/or just plain wrong. Some of the comic strips, particularly Trumbull's World, are pretty good.

England boasts two computer games magazines, *Computer & Video Games* and a new one from *PCW*, *Personal Computer Games*.

C & VG is a very good magazine and runs around 160 pages per monthly issue. Each issue has 13 or so program listings with one or two games for each of the popular computers. It also runs one or two long features, lots of shorts, and lots of ads. The October issue had a 16-page feature on 3-D games with red/green illustrations that gave a 3-D effect when viewed with the cardboard glasses enclosed.

Personal Computer Games is brand new and, for now, is scheduled for quarterly publication. It also has lots of program listings and many colorful reviews with tips for beating the various games.

Lest you be tempted to think that the computer magazine explosion is confined to the U.S. and U.K., we can say definitively that it is not. While in Paris, we had dinner with Matthew White of Systems Publishers in South Africa. His firm currently has five microcomputer-oriented magazines. And Ake Fredriksson of Handic Press in Stockholm gave us a copy of *Vic Rapport*, one of several new microcomputer magazines published by his firm.

Can the publishing boom last? Probably not forever, but it certainly shows no sign of slowing down yet!

Tidbit: According to a well-placed source in Britain, the feel of the new Sinclair keyboard is like the feel of dead flesh. END

"Dear Sir: When you can find time away from your computer, I'd like to speak to you. Signed, Your Wife."

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Three fantastic books from *Creative Computing Press*...

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The best articles and features on the Apple to appear in the past four years of *Creative Computing* are gathered together in this interesting and entertaining book. Revised and updated to include the latest information, this wealth of material gives you dozens of ways to tap the tremendous potential of your Apple. Contents range from graphics, music and educational applications to word processing, software reviews, games and tips on easier programming. Whatever you use your Apple for, you'll find plenty here to help you get more out of it than you ever imagined possible.

The Creative Apple, edited by Mark Pelczarski and Joe Tate. 8½" x 11", softcover, illustrated. $16.95.

THE CREATIVE ATARI

Whether you're an Atari beginner or seasoned expert, you really shouldn't be without this extraordinarily useful guide to practical Atari "how to" and lore. You get tutorials on Atari graphics, a discussion of Atari memory concepts, programming tips, programs and much more that will help you make better use of your Atari. It's written so the average, non-expert user who knows a little about BASIC and simple programming can easily develop into a skilled Atari user. The contents have appeared as articles, columns and tutorials in *Creative Computing*, but have been thoroughly revised and updated to insure maximum learning ease.

The Creative Atari, edited by David Small, Sandy Small and George Blank. 8½" x 11", softcover, illustrated. $15.95.

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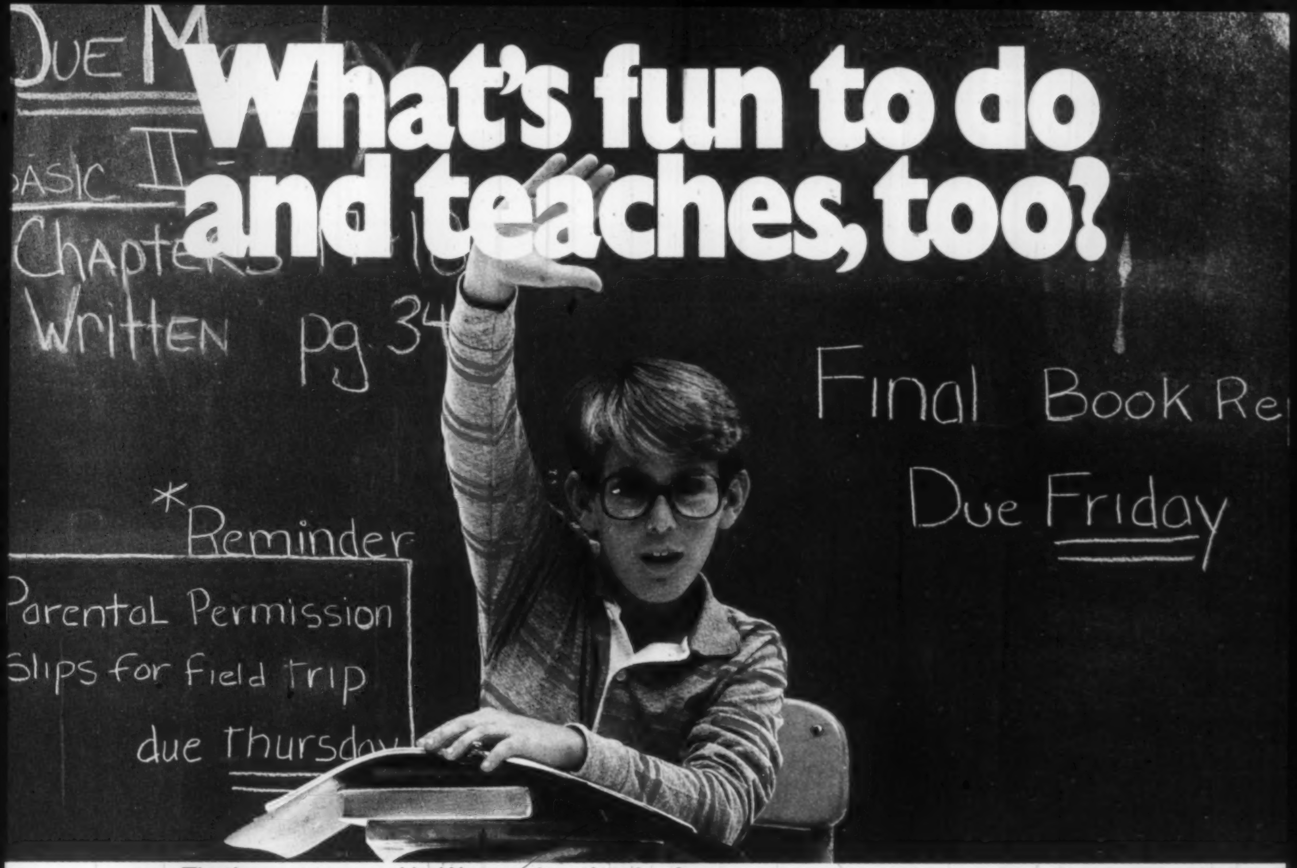

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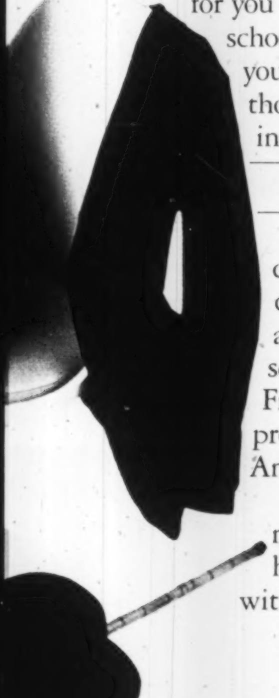

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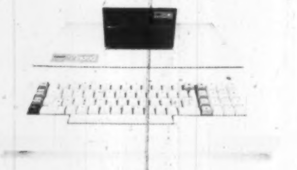

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The CBasic Clinic

Part 3

John A. Libertine

You have probably noticed that the first two sessions in this series went along slowly and easily to get you used to the CBasic language. You should now at least be familiar with the steps involved in writing, compiling, and running your CBasic programs.

From now on, you will find that things speed up and become a little more involved. Don't let this throw you. If you can't quite get the idea the first time, don't be afraid to reread and, above all, try the program listings. You can learn quite a bit more if you see the results on your screen or printer.

Error Messages

Before we start this session, I want to call your attention to the error messages in CBasic. You recall there are two kinds: one shows up when you compile a program; the other when you actually run it. Your documentation lists both kinds and explains the error. A better listing appears in *CBasic User Guide* (Osborne/McGraw Hill), which I urge you to buy. In my opinion, the *User Guide* listing gives much better explanations and corrective actions to be taken.

The most common compiler error you are likely to see is ERROR SE. The error notice is printed right under the line where it occurs and reads something like: ERROR SE IN LINE 47 AT POSITION 13. SE means syntax error. You may have misspelled a key word (pritn instead of print, for example). The next most common error is US (undefined string). It means you left the quotation mark off the beginning or, more likely, the end of a string. You will, undoubtedly, make your share of errors and thus have to learn about them as you go along. Some of them can be quite tricky, so take the time to read the documentation and try to think logically and slowly.

Okay, let's try a slightly different approach this time. Take a look at Listing 1, a simple program that allows you to enter the names, addresses, and scores of a bowling team. Note that I have used special numbers (A1, A2, and so on) at the left margin. These are for ease in reference only; you do *not* type them in your program.

First of all, read through the entire listing. You should be able to understand most of it. Of course, there are many new statements and functions that will be unclear; we will go into these in detail, but try to get the feel and the gist of the program first. This program not only lets you enter the data but saves them in a file so you can access them anytime. We will then do another short program to print the results out on your printer.

Subroutines

The first new statement is the very first word: GOSUB. As in most Basics, it means go to a subroutine. The figure next to it (in this case, 10000) refers to the *line number* where the subroutine starts. Remember that we don't need line numbers in CBasic *except* when we specifically refer to one. You will find line 10000 near the end (at A68). Most programmers put subroutines at the end.

In this case, there are three of them (at lines 10000, 20000, and 30000). It is customary in CBasic to use distinctive line numbers for subroutines. In this case, I have used large even numbers starting with 10000. You could also use a decimal line system: 1000.1, 1000.2, etc. The choice is yours as long as you are comfortable with it. Incidentally, for simplicity I will refer to program lines as line 1000 or line 20. The reference numbers at the left will be called simply A1, A34, and so on.

At A1, we tell the computer: Go to a subroutine that is located at line 10000. Line 10000 (at A68) is the beginning of our old friend from Part 2, the FOR-NEXT loop that clears the screen. This ends at A71. Now notice that A72 has the single word RETURN. This tells your computer we have reached the end of the subroutine and the program is to return to the line following the GOSUB instruction. In this case, the program now goes back to A2. Remember, *all subroutines* must be followed by a RETURN.

From A2 to A7, the program displays a title screen. The multiple print statements on A5 push everything on the screen up seven lines to center the words. The colons between each PRINT are shortcuts. They mean the next instruction is to print on the following line. In this case, each instruction merely prints a blank line.

A7 illustrates two significant CBasic statements: input and line. Input stops the program and waits for you to type something. In this case, we are asking that the RETURN key be pressed. The function here is to stop the program while the operator reads the screen. At A33 and several other places, the Input requested is a name or other data. In any case, Input serves two functions: It stops the program, and it accepts your input, which is then assigned to a variable. Usually, after you input the data, you hit the RETURN key to end the input. At A7, only the RETURN key need be hit because the function here is to halt only until you are ready to proceed.

Line Inputs

There are two basic kinds of inputs. A41 illustrates the usual one. Here you are asked to furnish a number (bowling score). The other kind is a line input. A33 is a typical example. Putting the word LINE before the variable NAME$

John A. Libertine, The Four Corners, Hanover, MA 02339.

makes it possible to enter a line of characters and/or numbers including most punctuation marks (commas, semicolons, and so on). Ordinarily, a comma indicates the end of one item and the beginning of another. For example, if you entered:

John,Joseph,Michael

each name would be considered a *separate* input, and you would need three variables (i.e., INPUT Name1$, Name2$,Name3$). In this case, the commas are considered delimiters; they set off each item individually. If you use the line type of input, the three would be *one* item (assigned to one variable), and it would be stored and printed out exactly as entered.

This line input is useful in an address line, for example:

100 Main Street, Apartment 2.

If you did not use the line input, the street address and apartment number would have to be two separate items assigned to two variables in the file, and the comma simply would not print out. If you try to assign such a line to a single variable, you would get an ERROR message.

One punctuation mark you cannot use in a line input is a quotation mark because quotation marks are used as the delimiters in this type of input. A simple way to visualize this is to see how CBasic stores items you input. Say you input an address:

100 Main Street, Apartment 2

If you use the regular input with two variables, here is how it looks in the file:

100 Main Street,Apartment 2

If you use the line input with one variable, it looks like this:

"100 Main Street, Apartment 2" (note the quotation marks).

In the first example, commas are the delimiters. In the second, commas are still the delimiters but not when they are *within a* string set off with quotation marks. You can see it better in a file that reads:

"10 Main St., Apartment 2", "Anytown, Mass."

The commas after St. and Anytown are literals, and they print. The comma between Apartment 2 and Anytown is a delimiter and does not print. This is two separate entries, of course.

In A7, the line input serves an additional function. When you hit RETURN, you are putting a null string—a string with nothing in it into the variable Dummy$. With the regular input, hitting RETURN has no effect. The computer does nothing but wait for more input or gives you an error message. By making it a line input, hitting RETURN puts in a null string in the form of two quotation marks next to each other (""). The computer sees this as an entry, assigns it to Dummy$, and goes to the next program line. Because we never call back Dummy$, it just serves to startup the program after a halt.

You must remember that the line type of input can be used *only* with string variables. CBasic does not allow this form with integer or real number variables.

In addition, compare A6 and A7 with A20. In the first case, we have a PRINT statement followed by an INPUT line. On your screen, A6 prints the line shown and, on the next line, A7 prints a question mark. At A20, the input is followed by a prompt string (a word or words) that will print on your screen. There isn't a question mark in this case, and the cursor stays on the same line. Either works. The second is usually easier and more efficient. With this background, you should now be able to understand the program completely through A21.

File Handling

Now we come to one of the most powerful functions of CBasic: file handling. For some reason, this whole business of files seems to throw neophytes for a loop. Let's approach it slowly and simply keeping in mind that, for now, we will sometimes oversimplify and leave out some of the more advanced features to make things easier.

The whole business of files seems to throw neophytes for a loop.

It helps to remember that a file is nothing more than data stored on your disk; thus it can be recalled anytime. You give it a name that follows the CP/M format (up to eight characters followed by an optional period and three character extension as: FILENAME.EXT). The data can be stored in two major forms: sequential and random access. The latter is more advanced and versatile, but for this program let's stick with the simpler sequential form. Sequential simply means the data are stored in a stream—one item right after the other.

The first step is to create the file. Two statements are available: create and file. The first creates a file unquestioningly. This means that if the same file name already exits, it *erases* it and *overwrites* it. The File statement creates a file only if the name does not exist on your disk. If it does exist, it opens the file (i.e., makes it available for reading or additional input). In our program, we are using this form. Once a file is created or opened, we do not refer to it again by file name. We use a number from 1 to 20 because 20 is the largest number of files we can have open at the same time. In the case of the File statement, the file number is the lowest unused number. In our programs that is number 1. The create statement requires you to give the file a number as in CREATE "FILENAME.FIL" AS 1. In either case, we refer to the file as 1 as long as it is active.

At A22, we name the file and assign it to a variable Filename$. At A24, we open the file. The first time you use this program, it creates the file. After that, the file exists and the program will open the file. This makes it possible, among other things, to add names and data to an existing file.

A25 is a key line. The IF END statement means: If in reading this file, should you come to the end of the file, then go to line 10. If we did not put this in, the program would read to the end of the file and, finding no further data, would cause a runtime error that would crash the program. A27 (line 20) illustrates the READ format. As I noted, the file is referred to as 1. The format for a read is:

READ #X semicolon variable comma variable comma and so on (where X is a file number from 1 to 20). Note that an IF END is *not* executed immediately. It only executes when and if you have read all the way through a file.

If you are running this program for the first time, the IF END executes at line 20 (A27) because it tries to read a file with no data in it. The program goes to line 10. If the file already exists, the read executes and reads the first series of the data (Name$ through String3). As you can see at A29, the program then returns to line 20 and reads the next series and so forth until the end of the file is reached. What is happening here is that the data are taken out of the disk file and placed into memory. When the end of the file is reached, the IF END executes and the program goes to line 10 (at A31). Just to illustrate that line numbers in CBasic do not have to follow any order, note that line 10 comes *after* line 20 in this program.

You should be able to figure out A26 and A28 (along with similar lines later in the program). This is a simple way to count the number of entries you make. At the end, we can print out the number of names in the file.

When the program gets to line 10, the GOSUB 10000 repeats the clear screen routine and the program begins to ask for inputs at A33 through A47. Note that after the three numeric inputs (for scores) there is an error trap line, which simply catches an input that is less than

1 or more than 300 (the range for bowling scores). You should be able to trace this for yourself now.

This is not a very sophisticated error trap, but it does not have to be because the operator has a chance to proofread his entries later. This error trap simply generates the warning message. This happens after the inputs at A50 through A57. I think you should be able to follow the logic without my going over each line.

Your assignment is to figure out the logic of the PRINTER.BAS program from your documentation or CBasic User Guide.

At A58 (or A62 depending on responses just preceding) the program has a GOSUB to A73. This is where the data are written onto the disk. The format is virtually identical to the READ statement except the command is PRINT #X instead of READ #X (where X is the file number).

Closing The File

At some point, the program must come to A63. To ensure that the data are safely transferred to disk, we must close the file. The command is simple: CLOSE X (X = file number). We are now at the end of the program. From A64 to A67, the final count is taken and printed on your screen.

The STOP statement at A67 is important. It prevents the program from continuing along and executing all the subroutines that follow. Unlike some Basics, we cannot use END here. An END in CBasic stops the compiler (which we don't want, of course), so the STOP is used instead. The difference is simple: END stops the program cold at any stage of compilation. STOP stops the program only in the runtime mode.

When you have written the program, store it, compile it (CBAS2 BOWL), and then run it (CRUN2 BOWL). Put in four or five names and scores. Note that you have three lines for addresses. If you do not need all of them, you merely enter RETURN (a null string, remember?). After you do this, you can read the file. Go to the A > prompt in CP/M and enter: TYPE BOWLING.FIL. The file will show up on your screen. Note the way the data are stored. The first few items (the ones entered with Line Input) are set off in quotes. The last three (entered with plain Input) are not. A typical line in your file should look like this:

"J. Jones", "10 Main St.","Anytown, CA 90000","",195,183,179 Notice the null string between 90000 and 195.

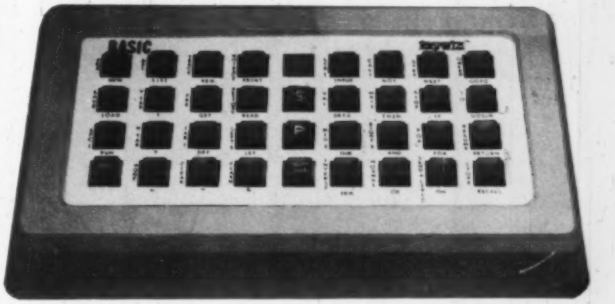
Now you should run the program a second time and add a few more names and scores to illustrate how to add to an existing file. Type it out on your screen again to see the additions.

Now would you like to see a formatted print out on your printer? Just enter the program in Listing 2. We will go into the whys and wherefores next session, but for now you must try it as a solo flight. Type, store, compile (CBAS2 PRINTER), and run it (CRUN2 PRINTER).

Your assignment before the next session is to try to figure out the logic of the PRINTER.BAS program from your documentation or the *CBasic User Guide*. Especially look up two new statements: the LPRINTER and CONSOLE commands. Good luck.

NAME THAT KEY

(ALL 248 OF THEM!)



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CBasic Clinic, continued...

Listing 1. Program name: BOWL.BAS

Important: This listing uses special line numbers (A1, A2, etc.) at the left margin. These are for reference only . . . you do not type them as part of the actual program!

```
A1    GOSUB 10000   REM  Clear the screen
A2    PRINT "          THIS IS A SIMPLE ENTRY PROGRAM FOR"
A3    PRINT
A4    PRINT "                     A BOWLING TEAM"
A5    PRINT:PRINT:PRINT:PRINT:PRINT:PRINT:PRINT
A6    PRINT "               HIT <RETURN> TO CONTINUE"
A7    INPUT LINE DUMMY$
A8
A9    GOSUB 10000
A10   PRINT "You will be prompted to enter a name followed by up to"
A11   PRINT
A12   PRINT "three address lines.  If you do not need all three lines,"
A13   PRINT
A14   PRINT "just hit <return> to skip.  You will then be prompted to"
A15   PRINT
A16   PRINT "enter the scores for each of three strings bowled."
A17   PRINT
A18   PRINT "You enter these numerically (i.e.  201 or 198 etc)."
A19   PRINT:PRINT:PRINT:PRINT:PRINT:PRINT:PRINT
A20   INPUT "Hit <return> to begin";LINE DUMMY$
A21
A22   FILENAME$="BOWLING.FIL"    REM Name the file
A23
A24   FILE FILENAME$              REM Open or create the file
A25   IF END #1 THEN 10
A26   COUNT% = 0
A27   20 READ #1;NAME$,ADD1$,ADD2$,ADD3$,STRING1,STRING2,STRING3
A28   COUNT% = COUNT% + 1
A29   GOTO 20     REM FIND END OF FILE
A30
A31   10 GOSUB 10000
A32   PRINT:PRINT
A33   INPUT "Full name:";LINE NAME$
A34   PRINT
A35   INPUT "Address line #1:";LINE ADD1$
A36   PRINT
A37   INPUT "Address line #2:";LINE ADD2$
A38   PRINT
A39   INPUT "Address line #3:";LINE ADD3$
A40   PRINT
A41   INPUT "Score for first string:";STRING1
A42   IF STRING1 >300 OR STRING1 <=0 THEN GOSUB 30000  REM Error Trap
A43   PRINT
A44   INPUT "Score for second string:";STRING2
A45   IF STRING2 >300 OR STRING2 <=0 THEN GOSUB 30000
A46   PRINT
A47   INPUT "Score for third string:";STRING3
A48   IF STRING3 >300 OR STRING3 <=0 THEN GOSUB 30000
A49   PRINT
A50   PRINT " ****PROOFREAD ABOVE CAREFULLY!!! ****"
A51   PRINT
A52   PRINT "1.  TO RE-DO, ENTER 'R' (for Re-do) THEN <RETURN>"
A53   PRINT "2.  If okay, and more names to do, enter <RETURN> only"
A54   PRINT "3.  IF FINISHED WITH ALL NAMES,"
A55   INPUT "    enter 'F' (for Finished) then <RETURN>";LINE ENTER$
A56   IF ENTER$="R" OR ENTER$="r" THEN GOTO 10
A57   IF ENTER$="F" OR ENTER$="f" THEN GOTO 1000
A58   GOSUB 20000    REM Write inputs to file
A59   COUNT% = COUNT% + 1
A60   GOTO 10
A61
A62   1000 GOSUB 20000   REM Write inputs to file
A63   CLOSE 1
A64   COUNT% = COUNT% + 1
A65   GOSUB 10000   REM Clear Screen
A66   PRINT "THERE ARE ";COUNT%;" NAMES IN THIS FILE NOW."
A67   STOP   REM  Main Program Ends Here
A68   10000  REM Clear Screen subroutine
A69   FOR I% = 1 TO 24
A70   PRINT
A71   NEXT I%
A72   RETURN
A73   20000 PRINT #1;NAME$,ADD1$,ADD2$,ADD3$,STRING1,STRING2,STRING3
A74   RETURN
A75   30000 PRINT "****INCORRECT SCORE ENTERED****"
A76   PRINT "RE-DO THIS ENTIRE ENTRY!!!!"
A77   RETURN
```

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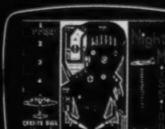

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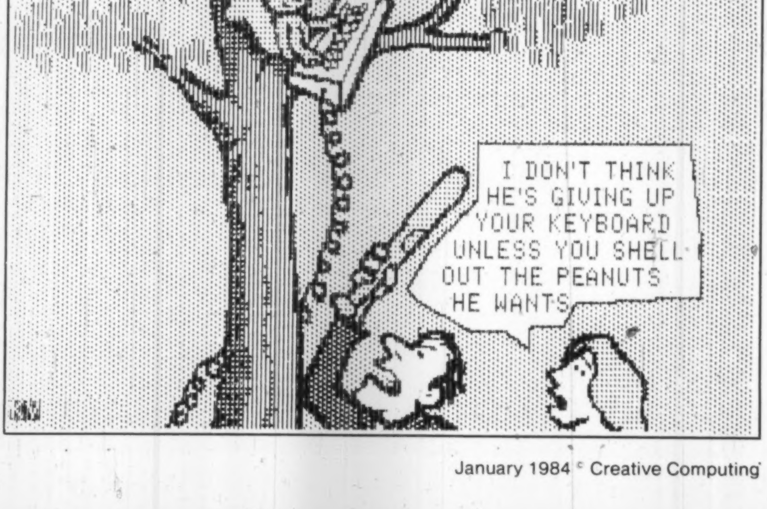
CBasic Clinic, continued...

Listing 2. Program name: PRINTER.BAS

```
GOSUB 10000
PRINT "        Tnis program will print-out a bowling team"
PRINT
PRINT "                  roster and scores"
PRINT
PRINT
PRINT "         ***** BE SURE YOUR PRINTER IS ON AND"
PRINT
PRINT "                    PAPER IS INSERTED"
PRINT:PRINT:PRINT:PRINT:PRINT:PRINT
INPUT "    Hit <RETURN> to print now.......:";LINE DUMMY$

LPRINTER

IF END #1 THEN 25
OPEN "BOWLING.FIL" AS 1
20 READ #1;NAME$,ADD1$,ADD2$,ADD3$,STRING1,STRING2,STRING3

PRINT NAME$
PRINT ADD1$
PRINT ADD2$
PRINT ADD3$
PRINT "First string score......";string1
PRINT "Second string score.....";string2
PRINT "Third string score......";string3
PRINT
LET Total.score = string1 + string2 + string3
LET Average = Total.score/3
PRINT "Total Score for three strings.....:";Total.score
PRINT
PRINT "Three string average .............:";Average
PRINT:PRINT:PRINT:PRINT
GOTO 20

25 CLOSE 1

CONSOLE

GOSUB 10000
GOSUB 20000
STOP

10000 FOR INDEX% = 1 TO 24
PRINT
NEXT INDEX%
RETURN
20000 PRINT:PRINT:PRINT:PRINT
PRINT "END OF PRINT-OUT OF 'PRINTER.BAS' "
RETURN
```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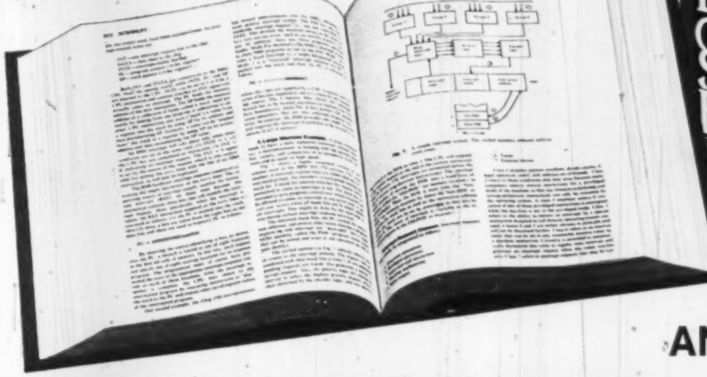

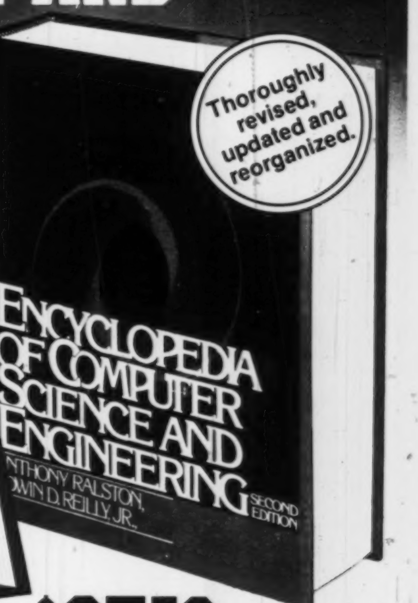
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How to deduct a personal computer on your tax return

WRITING IT OFF

FORM 1040
IRS
Patrick Calkins

Tony Shershin

So you bought a personal computer in 1983 and you wonder if some of the cost is tax deductible; or maybe you are thinking of buying one this year and are hesitating because of the cost. If you are self-employed and *using the computer in your business,* then the entire cost, up to $5000, is tax deductible for 1983. (For 1984, the amount increases to $7500.)

But how about most of us who are salaried employees? Unless your employer requires you to have a personal computer as a condition of employment, it probably will not be deductible. (One major exception is the employee whose job is directly computer related. More on this in the sections below dealing with employee expense and educational expenses.)

But don't give up yet. Why not start a part-time business of your own, thus creating self-employment status, or, if you own stocks, use your computer to maintain your accounts and analyze your investments. There are several software packages tailored specifically for investors. Under these circumstances, that portion of the cost which reflects the proportion of time the computer is used in this activity may be deductible.

For example, if the computer and related equipment, such as a printer and a disk drive, cost $3000 and of its 40 hours weekly use, 20 hours are in support of your business, then one half of $3000—$1500—can be deducted in 1983.

The IRS takes a dim view of any activity in which expenses exceed revenues.

Hobby Vs. Business

The IRS takes a dim view of any activity in which expenses exceed revenue. Where possible, the IRS will assert that the activity is a hobby rather than a business, thereby disallowing the expenses as deductions. To be a business, the main purpose must be to make a profit.

The easiest way to convince the IRS that you intend to turn a profit is to be profitable during two of any five consecutive years. Of course, that isn't much help if you are just starting out. If your activity is enjoyable (and thus likely to be termed a hobby if there is a string of consecutive losses), then I would suggest delaying a computer purchase for a year until you have generated a few dollars of profit. It is possible to petition the IRS to postpone their determination of your activity to be a hobby (if there are losses) until after the fourth year and, if your first year is profitable, this would allow a further postponement until the end of the fifth year.

Losses will not automatically cause your activity to be classified as a hobby. Remember, the key issue is your intent to make a profit. You can structure your activity to conform to certain guidelines that the IRS has said it will consider: You should carry on the activity in a businesslike manner. For example, have business cards printed, advertise, and keep a careful record of your expenses and income. If you, or your advisors, have expertise in the activity, then that is a real plus.

Spending a great deal of time and effort on the activity is also helpful. Success when engaged in other business

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Tony Shershin, Mathematical Sciences Dept., Florida International Univ., Miami, FL 33199.

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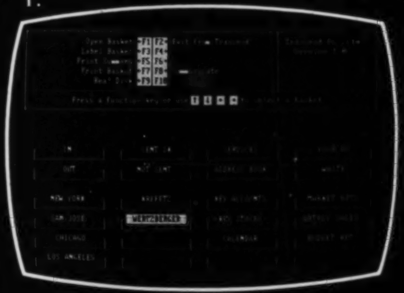

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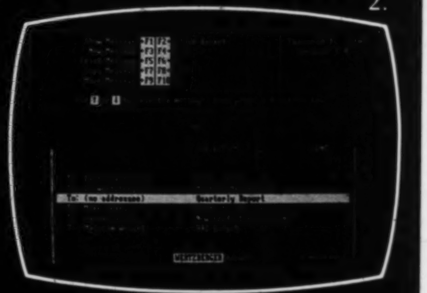

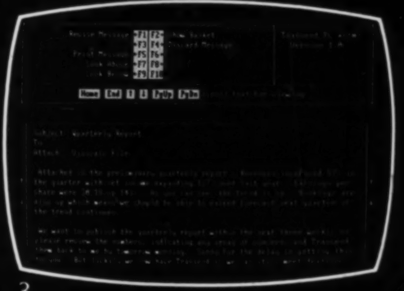

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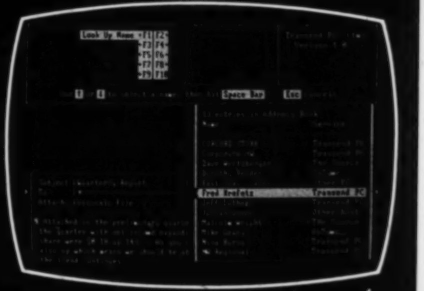

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activities is another favorable sign. Other items considered include: the size of the occasional profit, if any; your financial status; and the presence of personal pleasure or recreation (bad in the IRS view if there are losses). It is not necessary for all of the favorable criteria above to be present in your activity to avoid classification as a hobby. But the more elements that are present, the more likely that it will be treated as a business by the IRS.

It is important to document carefully the time you spend working with investments on the computer.

Computers To Manage Investments

Although investment activity is not considered a business by the IRS, nevertheless any investment expense can be claimed as an itemized deduction. Further, to the extent that your computer is used to manage your investments, that associated cost is deductible by using the Accelerated Cost Recovery System (ACRS). For example, if you have extensive stock holdings and you purchase a computer and appropriate software, then 15% of the cost can be deducted in the first year, 22% in the second year, and 21% in each of the next three years. As mentioned earlier, if your number of stocks is small, then the IRS will attempt to limit your deductions to a fraction of the cost based upon the actual percentage of time the computer is used to support your investments.

In case you decide to write off the purchase of a computer for this purpose, we will fill you in on the actual law in this instance: The law is embodied in Internal Revenue Code sections and in this case three sections need to be mentioned.

Section 212 is the law that allows us to deduct investment related expense, but does not apply to the purchase of capital items such as a computer. (It is noted in passing that the cost of leasing a computer or using a computer timeshare service would be deductible under 212.)

Section 179 allows a deduction of up to $5000 in 1983 and $7500 in 1984 if the purchased computer is used in a business.

This leaves us with only the depreciation and ACRS sections, 167 and 168, which apply to property held for the production of income as well as to property used in a trade or business. These are the two correct sections to cite when claiming the computer purchase depreciation deduction in connection with investments.

It is important to document carefully the time you spend working with investments on the computer. For instance, you should keep a daily log of the exact time the computer was used to analyze your stocks, which stocks were considered, and what decisions, if any, were made as a result of the computer analysis.

What specific software can be used to manage investments? There are several hundred programs. Clark Software Corp. of Shamokin, PA publishes for $5.95 the book *A Guide to Investor Software* which is recommended by the American Association of Individual Investors. Many programs are now priced below $300. One of the most popular is the *Dow Jones Market Analyzer* from RTR Software which retails for $250.

There are several recent survey articles in computer magazines which describe the available investment software and, if you own an Apple, *The Book of Apple Software* rates and critiques quite a few such programs. One highly rated package is *The Personal Investor* from PBL Corp ($95).

In contrast to such programs which analyze stock performance are data services which provide up-to-date information on stock prices, earnings, news, etc. These include The Source from Readers Digest, News/Retrieval from Dow Jones & Co., and CompuServe Information Service from H&R Block. Cost consists of an initial charge plus a per unit time fee and a minimum monthly charge.

For example, the Source has a $100 subscription fee and connect time runs from $2.75 to $25.00 per hour depending on the time and the day; the minimum monthly charge is $10. News/Retrieval has a $50 basic fee plus $75 annual fee (or $50 monthly fee depending on the plan selected) and a $0.10 and up per minute user charge; and CompuServe costs $40 initially with hourly fees ranging from $5.00 to $22.50 (depending on time and day) plus $0.02 and up per item. The data services are probably worthwhile only if you plan to do extensive investing. On the other hand, such services tend to substantiate the authenticity of your computer investment activity in the eyes of the IRS.

Computers As An Employee Expense

Anyone who works directly with a computer may be eligible to deduct the computer and software programs as employee expenses. This includes computer programmers and teachers of computer-based subjects. Performance of services as an employee constitutes a business for tax purposes so that ordinary and necessary business related expenses which are not reimbursed are deductible, but only if they are required by the employer or essential to the performance of one's duties. However, mere helpfulness is not enough to justify the deduction, so that caution should be used in claiming such a deduction: A letter from your supervisor attesting to the fact that the purchase of a computer is *essential* to performing your assigned duties is very desirable.

Computer Programs As An Educational Expense

You can deduct the cost of any education which is undertaken to maintain or to improve a skill required in your employment or business. Common examples of such expenses are purchases of technical books and subscriptions to professional journals.

Nowadays, it would seem logical that the purchase of computer programs, which maintain or improve employment skills, would qualify as an educational expense.

Deductible Computer Items

Hardware. If a computer and related items such as a printer, monitor, and disk drive are used for business purposes, and if the purchase was in 1983, then the entire cost, up to $5000 of all this equipment can be deducted on your 1983 tax return. For example, if you buy a computer costing $1500, a printer costing $700, a disk drive costing $400, and a monitor costing $100, the entire amount—$2700—can be deducted. (If you buy such a computer system in 1984, the entire cost can be deducted on your 1984 tax return.)

You can deduct the cost of any education which is undertaken to maintain or to improve a skill required in your employment.

If you go all out and spend more than $5000, then the excess may be partially deducted in 1983 by using the Accelerated Cost Recovery System (ACRS). For example, if the computer system cost $7000 in 1983, an additional $300 can be deducted on your 1983 return.

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Star Bowl Football (Disk)	31.95	25.95
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CIRCLE 182 ON READER SERVICE CARD

This amount is calculated by multiplying the excess, $2000, by 15%, which is the percentage allowed the first year under the ACRS. $440, 22% of $2000, may also be deducted on your 1984 tax return as well as $420 (21% of $2000) on each of your 1985, 1986, and 1987 tax returns.

By the way, if you bought a computer before 1983 for your personal pleasure and now plan to use it in a business, then its current market value or its original cost, whichever is lower, can be deducted over a five-year period as indicated in the previous paragraph.

> ***If you do lease a computer, be sure that it does not contain a purchase option clause.***

As an alternative to deducting up to $5000 the first year (the so-called Section 179 election), if a computer is used for business purposes, it is possible to use the ACRS to spread out the deduction over a five-year period if you prefer. The advantage of this approach is that you will also be eligible for the *investment tax credit* (more useful than a deduction) which lets you claim up to 10% of the cost of the computer.

Most people prefer to deduct the full amount immediately, but there are circumstances in which this alternative may be more desirable. For example, if other business expenses largely offset income in the year that the computer system is purchased, then it would be better to postpone some of the deduction to future years when income is greater.

Software. Suppose you buy some programs to be used in your business. The programs are certainly deductible but often not entirely in the year of purchase. The arena of software deductibility is littered with confusion. So let's try and keep it simple:

If the program is bought at the same time as the computer and its cost is *not* separately stated on the bill of sale, then it is considered as part of the system and may be deducted entirely in the first year as a part of the system (when the total cost is less than $5000). That is why computer shops often give a system price rather than pricing each of the items in the system individually.

If the cost of the software program is separately stated, then in tax terms it is considered an intangible asset and must be amortized, i.e., deducted, over a five-year span. That is, 15% of its cost may be deducted in the first year and additional amounts in each of the next four years, according to the ACRS guidelines discussed previously.

There is, however, one important exception: If the program can be used only for a limited period of time, say one year, then it can be amortized over that shorter period of time. For example, if you were to operate a part-time tax practice and bought a program to help you fill out the 1983 forms, then its entire cost could be deducted in the year of purchase.

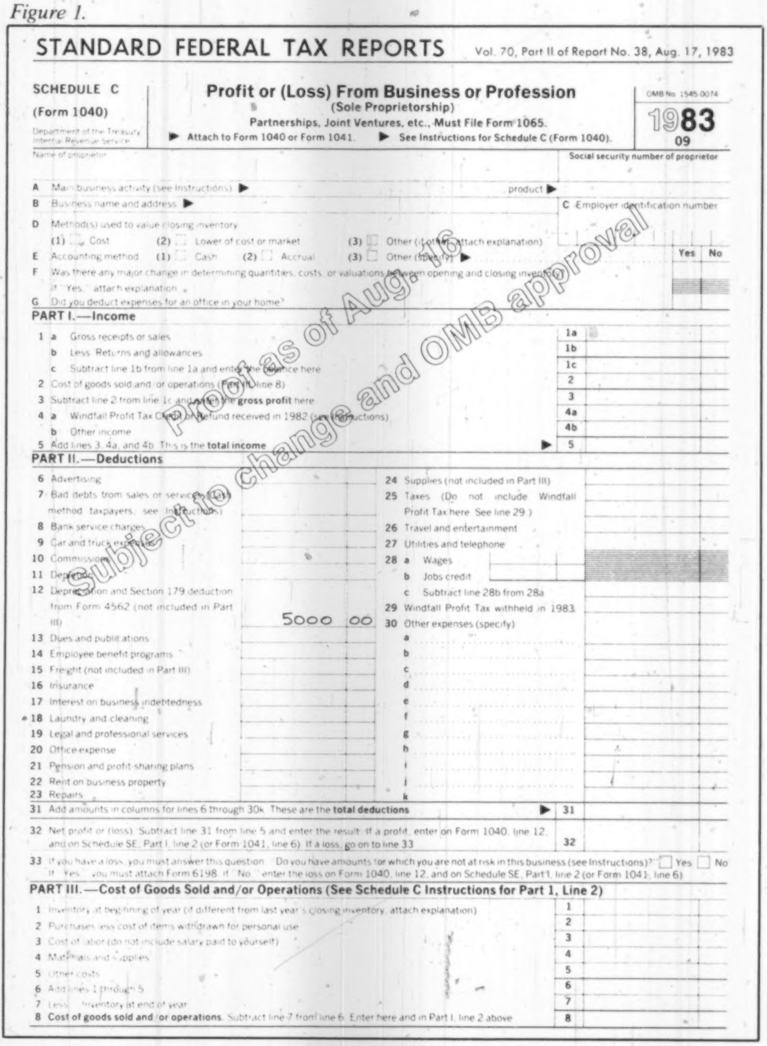
Leasing. Leasing is like paying rent. As such it is a deductible business expense. It is also deductible if the leased equipment (computer or software) is used to manage income-producing property, such as stocks and bonds. (Technically, in tax lingo, this latter case is referred to as a deductible "nonbusiness" expense.)

As an example, suppose you lease a computer for three years at a cost of $4500. Then $1500 can be deducted on your tax return in each of the three years.

Some computer companies and computer stores lease their products to appeal to business customers since the lease cost can be immediately deducted in contrast to a sold item which must usually be depreciated. However, for the *personal* computer user there is no particular advantage in leasing because of the first year write off of up to $5000 in 1983 (and $7500 in 1984).

Even for more expensive computers the tax law enacted in 1981, which allows rapid ACRS write-off of a com-

Figure 1.



STANDARD FEDERAL TAX REPORTS Vol. 70, Part II of Report No. 38, Aug. 17, 1983

SCHEDULE C
(Form 1040)
Department of the Treasury
Internal Revenue Service

Profit or (Loss) From Business or Profession
(Sole Proprietorship)
Partnerships, Joint Ventures, etc., Must File Form 1065.
▶ Attach to Form 1040 or Form 1041. ▶ See Instructions for Schedule C (Form 1040).

OMB No. 1545-0074
1983
09

Name of proprietor
Social security number of proprietor

A Main business activity (see Instructions) ▶ product ▶
B Business name and address ▶
C Employer identification number
D Method(s) used to value closing inventory
(1) ☐ Cost (2) ☐ Lower of cost or market (3) ☐ Other (if other, attach explanation)
E Accounting method (1) ☐ Cash (2) ☐ Accrual (3) ☐ Other (specify) ▶

	Yes	No
F Was there any major change in determining quantities, costs, or valuations between opening and closing inventory? If "Yes," attach explanation		
G Did you deduct expenses for an office in your home?		

PART I.—Income

1 a Gross receipts or sales	1a	
b Less: Returns and allowances	1b	
c Subtract line 1b from line 1a and enter the balance here	1c	
2 Cost of goods sold and/or operations (Part III, line 8)	2	
3 Subtract line 2 from line 1c and enter the **gross profit** here	3	
4 a Windfall Profit Tax Credit or Refund received in 1982 (see Instructions)	4a	
b Other income	4b	
5 Add lines 3, 4a, and 4b. This is the **total income** ▶	5	

PART II.—Deductions

6 Advertising		24 Supplies (not included in Part III)	
7 Bad debts from sales or services (Cash method taxpayers, see Instructions)		25 Taxes (Do not include Windfall Profit Tax here. See line 29.)	
8 Bank service charges		26 Travel and entertainment	
9 Car and truck expenses		27 Utilities and telephone	
10 Commissions		28 a Wages	
11 Depletion		b Jobs credit	
12 Depreciation and Section 179 deduction from Form 4562 (not included in Part III)	5000 00	c Subtract line 28b from 28a	
13 Dues and publications		29 Windfall Profit Tax withheld in 1983	
14 Employee benefit programs		30 Other expenses (specify)	
15 Freight (not included in Part III)		a	
16 Insurance		b	
17 Interest on business indebtedness		c	
18 Laundry and cleaning		d	
19 Legal and professional services		e	
20 Office expense		f	
21 Pension and profit-sharing plans		g	
22 Rent on business property		h	
23 Repairs		i	
		j	
		k	

31 Add amounts in columns for lines 6 through 30k. These are the **total deductions** ▶	31	
32 Net profit or (loss). Subtract line 31 from line 5 and enter the result. If a profit, enter on Form 1040, line 12, and on Schedule SE, Part I, line 2 (or Form 1041, line 6). If a loss, go on to line 33	32	

33 If you have a loss, you must answer this question: "Do you have amounts for which you are not at risk in this business (see Instructions)?" ☐ Yes ☐ No
If "Yes," you must attach Form 6198. If "No," enter the loss on Form 1040, line 12, and on Schedule SE, Part I, line 2 (or Form 1041, line 6)

PART III.—Cost of Goods Sold and/or Operations (See Schedule C Instructions for Part 1, Line 2)

1 Inventory at beginning of year (if different from last year's closing inventory, attach explanation)	1	
2 Purchases less cost of items withdrawn for personal use	2	
3 Cost of labor (do not include salary paid to yourself)	3	
4 Materials and supplies	4	
5 Other costs	5	
6 Add lines 1 through 5	6	
7 Less: Inventory at end of year	7	
8 **Cost of goods sold and/or operations.** Subtract line 7 from line 6. Enter here and in Part I, line 2 above	8	

Proof as of Aug. 16
Subject to change and OMB approval

puter over a mere five year period, has made leasing somewhat antiquated from a tax standpoint. Of course, leasing can still be beneficial in a technological sense because computers are quickly outdated and leasing allows for rapid conversion to new equipment.

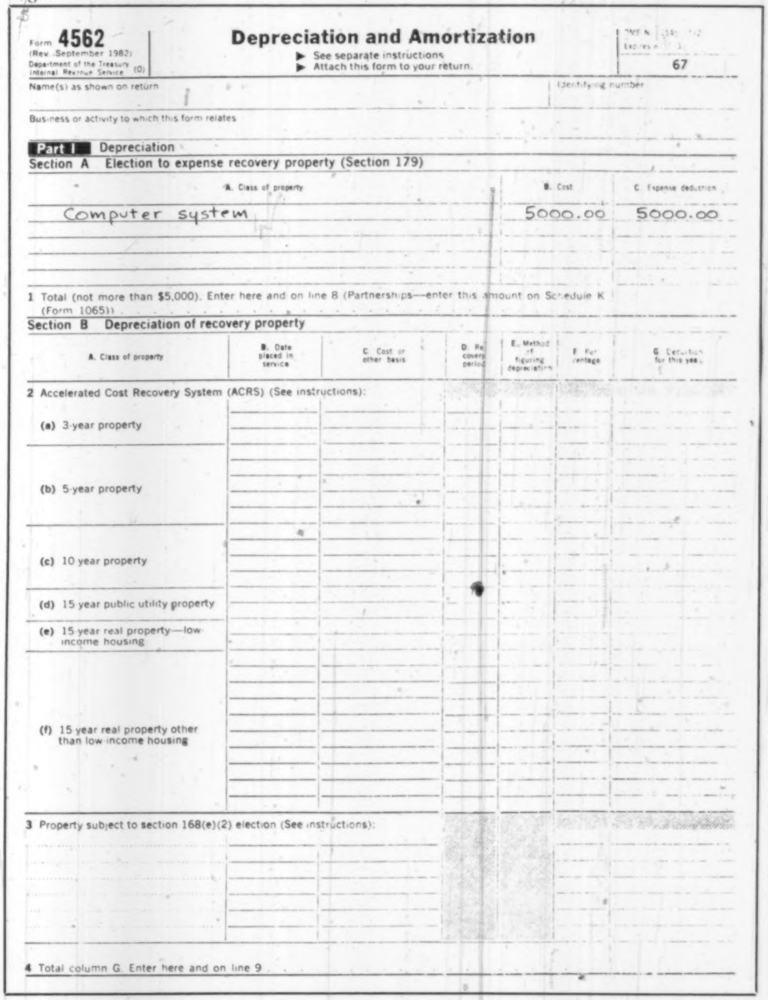
But if you do lease a computer, be sure that is does not contain a purchase option clause. If it does have such a clause, then the IRS will probably view it as a sale, rather than a lease. Although I doubt that the actual tax deductions would differ significantly, just refiguring the actual tax could be a headache.

Give away your old computer. Suppose you bought your computer only for personal enjoyment and, consequently, were not able to deduct any of the cost. When your computer gets old—and it will sooner than you think—keep in mind that if you give it to your church or favorite charitable organization, then you can claim its current market value as a charitable contribution.

The higher your tax bracket, the greater will be your savings. This method may be preferable to the hassle of trying to sell an outdated machine. Moreover, the goodwill generated may more than compensate for the difference between a sales price and the realized savings via a contribution.

Other deductible business-related expenses. In addition to allowing you to deduct the cost of a computer system and software, starting a part-time business will allow you to deduct other expenses also. The more common such business related expenses are: advertising, car use, home office (be careful), legal fees, postage, supplies, taxes and tax advice, telephone, travel (such as plane trip and hotel stay) and entertainment

Figure 2.



Form **4562**
(Rev. September 1982)
Department of the Treasury
Internal Revenue Service (0)

Depreciation and Amortization

▶ See separate instructions.
▶ Attach this form to your return.

[illegible]
67

Name(s) as shown on return
Identifying number

Business or activity to which this form relates

Part I Depreciation

Section A Election to expense recovery property (Section 179)

A. Class of property	B. Cost	C. Expense deduction
Computer system	5000.00	5000.00

1 Total (not more than $5,000). Enter here and on line 8 (Partnerships—enter this amount on Schedule K (Form 1065))

Section B Depreciation of recovery property

A. Class of property	B. Date placed in service	C. Cost or other basis	D. Recovery period	E. Method of figuring depreciation	F. Percentage	G. Deduction for this year
2 Accelerated Cost Recovery System (ACRS) (See instructions):						
(a) 3-year property						
(b) 5-year property						
(c) 10 year property						
(d) 15 year public utility property						
(e) 15 year real property—low income housing						
(f) 15 year real property other than low income housing						
3 Property subject to section 168(e)(2) election (See instructions):						
4 Total column G. Enter here and on line 9						

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TIP DISK #1		13.95
TYPEFACES		13.95
PLANETFALL OR ENCHANTER		32.95
MOST AMAZING THING		26.95
RENDEZVOUS		26.95
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PFS: GRAPH		81.95
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PRONTO DOS		19.95
DOUBLE TAKE		22.95
ALPHA PLOT		24.95
APPLE MECHANIC		19.95
BEAGLE BASIC		23.95
DOS BOSS		15.95
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THE GENERAL MANAGER II		148.95
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KOALA PAD		89.95
VISITREND/PLOT		198.95
KNOW YOUR APPLE IIE		16.95
UTILITY CITY		19.95
GPLE		42.95
ZARDAX		154.95
COPY II PLUS		24.95
MAGIC WINDOW II		93.95
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ORCA/M		99.95
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CIRCLE 223 ON READER SERVICE CARD

Writing It Off, continued...

(be careful; keep a *detailed* log).

Where To Deduct

Business use. If you buy a computer for a business in 1983, then its cost, when less than $5000, may be entered on line 12 of Part II on Schedule C (Profit or (Loss) From Business or Profession). (See Figure 1.) A description of the computer system must be given in Section A of Part I of Form 4562 (Depreciation and Amortization).(See Figure 2.) If the cost is more than $5000, the deducted ACRS amount is entered also on Schedule C and Form 4562 (Section B). (See Figures 1 and 3.)

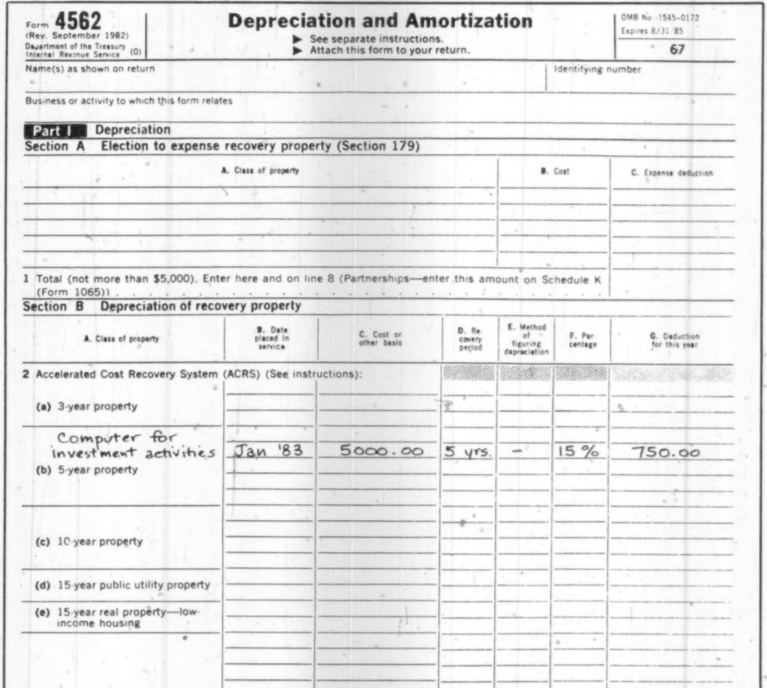
Other business expenses are also listed in Part II of Schedule C.

Employee business expense. Unreimbursed expenses are itemized on line 24 (miscellaneous deductions) of Schedule A (see Figure 4.) A sheet detailing these expenses should be attached to Schedule A. (Prior to 1982, Form 2106 (Employee Business Expenses) was also required, but the form was revised for the 1982 tax returns and is no longer appropriate for itemized deductions except for educational expenses.)

Managing Investments. When you use a leased computer or a computer time-sharing service to determine which stocks to buy and sell, this investment expense is an itemized deduction and is entered on line 24 (miscellaneous deductions) of Schedule A. (See Figure 4.) This is also the place to enter the cost of any investment related computer programs that you may have purchased during the year. However, expensive programs which can be used year after year should be depreciated in the same manner as the computer.

If a computer is bought, the ACRS

Figure 3.



Form **4562**
(Rev. September 1982)
Department of the Treasury
Internal Revenue Service (0)

Depreciation and Amortization
▶ See separate instructions.
▶ Attach this form to your return.

OMB No. 1545-0172
Expires 8/31/85
67

Name(s) as shown on return
Identifying number
Business or activity to which this form relates

Part I Depreciation

Section A Election to expense recovery property (Section 179)

A. Class of property	B. Cost	C. Expense deduction
1 Total (not more than $5,000). Enter here and on line 8 (Partnerships—enter this amount on Schedule K (Form 1065))		

Section B Depreciation of recovery property

A. Class of property	B. Date placed in service	C. Cost or other basis	D. Recovery period	E. Method of figuring depreciation	F. Percentage	G. Deduction for this year
2 Accelerated Cost Recovery System (ACRS) (See instructions):			▨	▨	▨	▨
(a) 3-year property						
Computer for investment activities (b) 5-year property	Jan '83	5000.00	5 yrs.	–	15 %	750.00
(c) 10-year property						
(d) 15-year public utility property						
(e) 15-year real property—low-income housing						
(f) 15-year real property other than low-income housing						
3 Property subject to section 168(e)(2) election (See instructions):			▨	▨		
4 Total column G. Enter here and on line 9 . .						

See Paperwork Reduction Act Notice on page 1 of the separate instructions.
Form **4562** (Rev. 9-82)

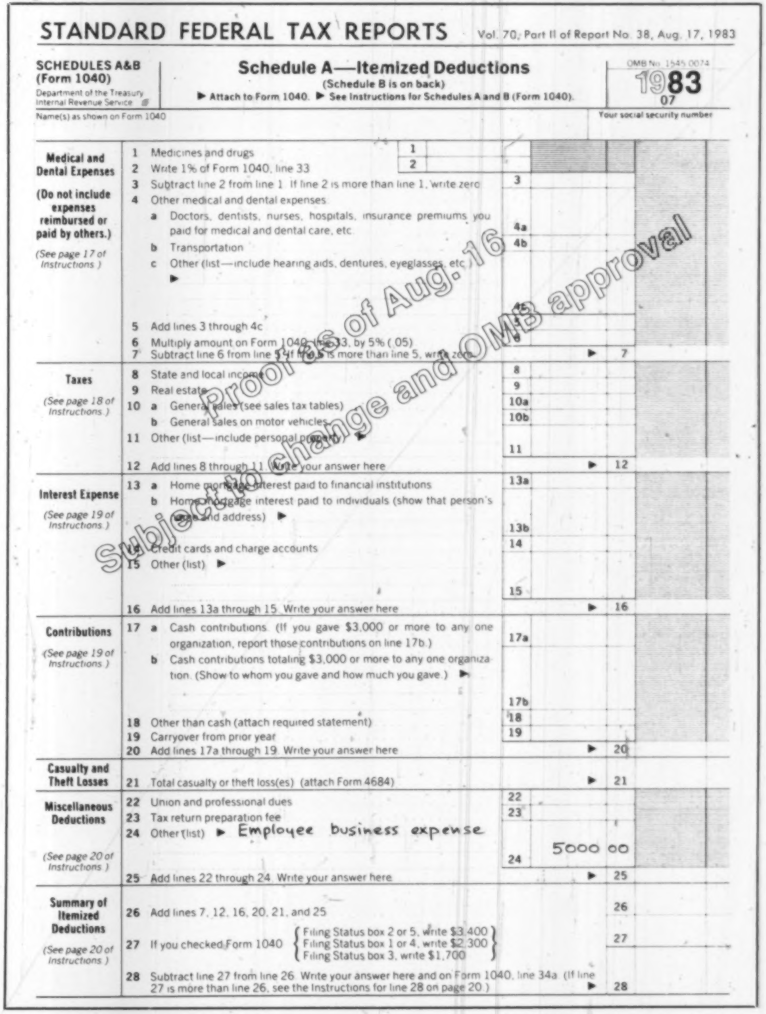
amount should be entered at item 2(b) (5-year property)—in Section B on the depreciation form 4562 (See Figure 3). Write in the phrase "a computer for investment activities" above the 5-year property label; specify 5 years in column D, a dash in column E, and 15% in column F; fill in columns B,C, and G. Normally this ACRS amount is entered on Schedule C or on Schedule E (Supplemental Income), but since neither of these schedules deals with securities investments, and Schedule D (Capital Gains and Losses) has no place to list such a deduction, in my opinion it should be listed at line 24 (miscellaneous deductions) on Schedule A.

A caveat is in order at this point: Since this is not the ordinary place to list an ACRS deduction, it is possible that the IRS may wish to have you explain this item if you are audited; if so, it would be best to consult a professional tax advisor for representation at such a meeting.

As an alternative, you could list the ACRS amount deducted on line 18 of Form 1040 and attach an explanation sheet to Schedule E; this approach is especially useful if you do not itemize your deductions (and, therefore, do not use Schedule A).

Educational expenses. These are also listed under itemized miscellaneous deductions on Schedule A. However, you must also attach a brief statement on a separate sheet of paper explaining the deduction and describing the relationship of the education to your employment duties. Moreover, if you are an employee, you must fill out Part III of Form 2106. END

Figure 4.



STANDARD FEDERAL TAX REPORTS Vol. 70, Part II of Report No. 38, Aug. 17, 1983

SCHEDULES A&B (Form 1040)
Department of the Treasury
Internal Revenue Service

Schedule A—Itemized Deductions
(Schedule B is on back)
▶ Attach to Form 1040. ▶ See Instructions for Schedules A and B (Form 1040).

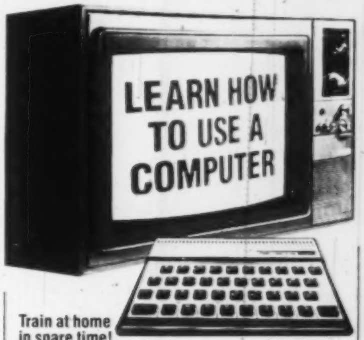
OMB No. 1545-0074
1983
07

Name(s) as shown on Form 1040

Your social security number

Medical and Dental Expenses **(Do not include expenses reimbursed or paid by others.)** *(See page 17 of Instructions.)*	1		Medicines and drugs	1	
	2		Write 1% of Form 1040, line 33	2	
	3		Subtract line 2 from line 1. If line 2 is more than line 1, write zero	3	
	4		Other medical and dental expenses		
		a	Doctors, dentists, nurses, hospitals, insurance premiums you paid for medical and dental care, etc.	4a	
		b	Transportation	4b	
		c	Other (list—include hearing aids, dentures, eyeglasses, etc.) ▶	4c	
	5		Add lines 3 through 4c	5	
	6		Multiply amount on Form 1040, line 33, by 5% (.05)	6	
	7		Subtract line 6 from line 5. If line 6 is more than line 5, write zero ▶	7	
Taxes *(See page 18 of Instructions.)*	8		State and local income	8	
	9		Real estate	9	
	10	a	General sales (see sales tax tables)	10a	
		b	General sales on motor vehicles	10b	
	11		Other (list—include personal property) ▶	11	
	12		Add lines 8 through 11. Write your answer here ▶	12	
Interest Expense *(See page 19 of Instructions.)*	13	a	Home mortgage interest paid to financial institutions	13a	
		b	Home mortgage interest paid to individuals (show that person's name and address) ▶	13b	
	14		Credit cards and charge accounts	14	
	15		Other (list) ▶	15	
	16		Add lines 13a through 15. Write your answer here ▶	16	
Contributions *(See page 19 of Instructions.)*	17	a	Cash contributions. (If you gave $3,000 or more to any one organization, report those contributions on line 17b.)	17a	
		b	Cash contributions totaling $3,000 or more to any one organization. (Show to whom you gave and how much you gave.) ▶	17b	
	18		Other than cash (attach required statement)	18	
	19		Carryover from prior year	19	
	20		Add lines 17a through 19. Write your answer here ▶	20	
Casualty and Theft Losses	21		Total casualty or theft loss(es) (attach Form 4684) ▶	21	
Miscellaneous Deductions *(See page 20 of Instructions.)*	22		Union and professional dues	22	
	23		Tax return preparation fee	23	
	24		Other (list) ▶ Employee business expense	24	5000 00
	25		Add lines 22 through 24. Write your answer here ▶	25	
Summary of Itemized Deductions *(See page 20 of Instructions.)*	26		Add lines 7, 12, 16, 20, 21, and 25	26	
	27		If you checked Form 1040 { Filing Status box 2 or 5, write $3,400 } { Filing Status box 1 or 4, write $2,300 } { Filing Status box 3, write $1,700 }	27	
	28		Subtract line 27 from line 26. Write your answer here and on Form 1040, line 34a. (If line 27 is more than line 26, see the Instructions for line 28 on page 20.) ▶	28	

Proofs of Aug. 16
Subject to change and OMB approval



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Using VisiCalc to Compute Your Income Tax

David A. Williams

Income tax afflicts everyone, but if you have a computer, you can make the calculations less painful and perhaps avoid over- or underpayment by estimating your tax liability throughout the year. Many programs on the market calculate your tax and even fill out the forms for you, but if you own *VisiCalc* and your return is not too complex, you don't need to buy another program.

This article describes a *VisiCalc* "program" that helps you estimate your tax liability as the year progresses and then does the necessary calculations for your return. It won't print the data on the return, but it is a simple job to transfer the data because the format is designed to resemble the appropriate IRS forms.

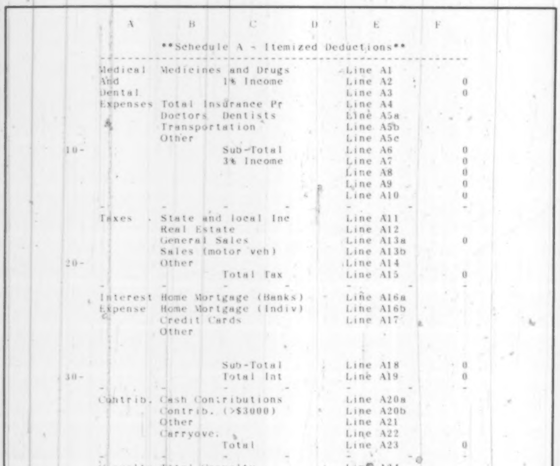
The program is set up for a joint return that includes Form 1040 and Schedules A, B, D, and W. The output from the schedules is automatically entered on Form 1040 in the appropriate place. This is about all that 48K of RAM can handle, but data from other schedules can be entered manually on the 1040 in the spaces provided.

> **If you own VisiCalc and your return is not too complex, you don't need to buy another program.**

Program Description

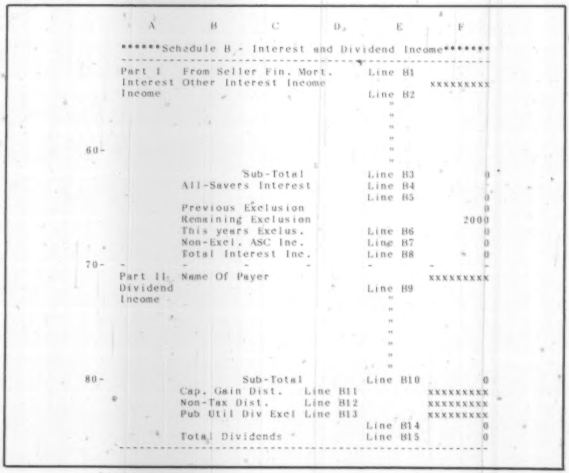
Figures 1 through 5 show the *VisiCalc* display or printout before data have been entered. The row and column headings are not part of the program, but were added for clarity. As much as possible the format matches the corresponding IRS forms. The width, except for Schedule D, was held to six columns or 54 characters so that the entire width would be visible on my 64-column display. Line numbers are included to help transfer the data to the real forms. The forms have been arranged in vertical sequence to make it easy to add more rows. In some cases space has been provided to enter the data in more detail than is required to aid in keeping records.

David A. Williams. 2452 Chase Circle. Clearwater. FL 33546.



```
           A         B         C         D        E         F

              **Schedule A - Itemized Deductions**
      ------------------------------------------------------
      Medical  Medicines and Drugs           Line A1
      And                1% Income           Line A2        0
      Dental                                 Line A3        0
      Expenses Total Insurance Pr            Line A4
               Doctors  Dentists             Line A5a
               Transportation                Line A5b
               Other                         Line A5c
10-                      Sub-Total           Line A6        0
                         3% Income           Line A7        0
                                             Line A8        0
                                             Line A9        0
                                             Line A10       0
      -        -         -         -         -        -     -
      Taxes    State and local Inc           Line A11
               Real Estate                   Line A12
               General Sales                 Line A13a      0
               Sales (motor veh)             Line A13b
20-            Other                         Line A14
                         Total Tax           Line A15       0
      -        -         -         -         -        -     -
      Interest Home Mortgage (Banks)         Line A16a
      Expense  Home Mortgage (Indiv)         Line A16b
               Credit Cards                  Line A17
               Other


                         Sub-Total           Line A18       0
30-                      Total Int           Line A19       0
      -        -         -         -         -        -     -
      Contrib. Cash Contributions            Line A20a
               Contrib. (>$3000)             Line A20b
               Other                         Line A21
               Carryove.                     Line A22
                         Total               Line A23       0
      -        -         -         -         -        -     -
      Casualty Total Casualty                Line A24
      Theft    Union, Profess dues           Line A25a
40-   Miscell. Tax Prep Fee                  Line A25b
               Other


                         Sub-Tot             Line A26       0
                         Total Misc.         Line A27       0
      -        -         -         -         -        -     -
      Summary  Total Deductions              Line A28       0
                                             Line A29    3400
               Net Deductions                Line A30       0
50-   ------------------------------------------------------
```

Figure 1. Schedule A.



```
           A         B         C         D        E         F

      ******Schedule B - Interest and Dividend Income*******
      ------------------------------------------------------
      Part I   From Seller Fin. Mort.        Line B1
      Interest Other Interest Income                xxxxxxxxx
      Income                                 Line B2
                                                "
                                                "
                                                "
                                                "
60-                                             "
                                                "
                         Sub-Total           Line B3        0
               All-Savers Interest           Line B4
                                             Line B5        0
               Previous Exclusion                           0
               Remaining Exclusion                       2000
               This years Exclus.            Line B6        0
               Non-Excl. ASC Inc.            Line B7        0
               Total Interest Inc.           Line B8        0
70-   -        -         -         -         -        -     -
      Part II  Name Of Payer                        xxxxxxxxx
      Dividend                               Line B9
      Income                                    "
                                                "
                                                "
                                                "
                                                "
                                                "
                                                "
80-                      Sub-Total           Line B10       0
               Cap. Gain Dist.   Line B11           xxxxxxxxx
               Non-Tax Dist.     Line B12           xxxxxxxxx
               Pub Util Div Excl Line B13           xxxxxxxxx
                                             Line B14       0
               Total Dividends               Line B15       0
      ------------------------------------------------------
```

Figure 2. Schedule B.

Figure 6 is a listing of the formulas used to calculate the data. The letter and numbers following the arrow indicate the cell in which the formula must be entered. Logic functions are used extensively to calculate entries that are dependent on the data. For example, F18 contains the formula for calculating general sales tax based on the tables provided by the IRS. The formula shown is for a family of five with an adjusted gross income greater than $38,001 and living in Florida. The formula for the same family with an income between $26,001 and $38,000 would be: @IF (F179 < 26001,0,277 + (@INT((F179 + @IF (E159 > E158, E158, E159) + F67 + F104-26001)/2000)*14))

The formula can be adapted to other income ranges and numbers of dependents by changing the numbers 26001, 277, and 14 to the appropriate values from the sales tax tables. Figure 7 shows an excerpt from the Optional State Sales Tax tables from which these figures are taken.

To set up the formula for your situation, first select your state, then find the row where the minimum income is less than your range of interest (26001 in the example). Next, find the sales tax in the column under the correct number of dependents (277 in the example). Finally, find the difference between that and the sales tax in the next row down (14 in the example). The formula is then accurate for as many rows as the increment is constant.

For incomes greater than $38,001, use the sales tax shown in the row for incomes between $38,001 and $40,000, and the increment given directly below. Substitute these values in the formula shown in the listing.

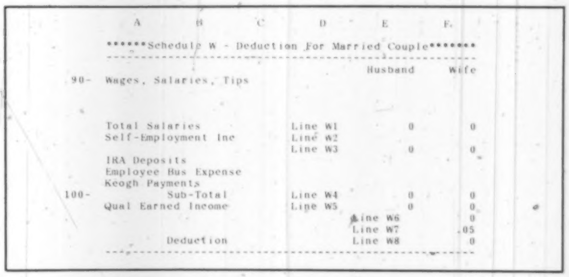
The income used is the adjusted gross income from Form 1040, line 33, the dividends exclusion, All-Savers interest, and the married couple deduction. You may be entitled to include additional non-taxable income. Consult the instructions for the sales tax tables. Make sure your total income doesn't exceed the upper limit for the range you have set up, and don't forget to change the formula if the number of dependents changes.

If your income turns out to be less than that for which the formula was set up, it will return $0, which should alert you that something is wrong. No warning is given if you exceed the range on the high side, but the error will be small if you don't go too far over.

The formulas in cells H182, G183, H183, and F184 are used to calculate your tax if you use either Schedule Y or the tax tables, your taxable income is greater than $11,900, and you are a married couple filing jointly. If your filing status is different, a comparison of these formulas with the numbers in Schedule Y shows how they were derived. H182 adjusts incomes under $50,000 so that the formulas give the same answer as the tax tables. The others calculate the tax and are separate only because the formulas are too long to fit in one cell. The correct tax always appears in F184; therefore, it is the only one that needs to be displayed or printed.

Loading The Program

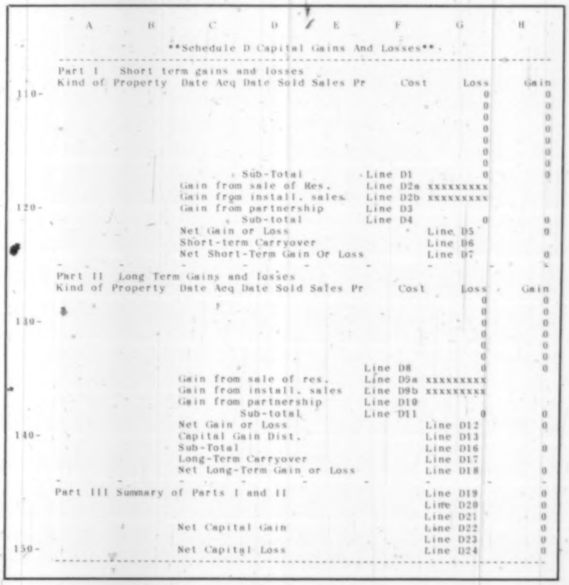
Enter the program by typing the labels from Figures 1 through 5, the numbers in cells F48 and E159 (entered as values), and the formulas from the listing in Figure 6. Everything to the right of the colon must be entered. F103 contains a format statement and a value (.05), and F154 contains a format statement. The purpose of the format state-



```
           A         B          C          D         E          F

              ******Schedule W - Deduction For Married Couple*******
              ------------------------------------------------------
                                                   Husband      Wife
      90-   Wages, Salaries, Tips



            Total Salaries                Line W1          0          0
            Self-Employment Inc           Line W2
                                          Line W3          0          0
            IRA Deposits
            Employee Bus Expense
            Keogh Payments
     100-            Sub-Total            Line W4          0          0
            Qual Earned Income            Line W5          0          0
                                                   Line W6            0
                                                   Line W7          .05
                     Deduction                     Line W8            0
            ------------------------------------------------------
```

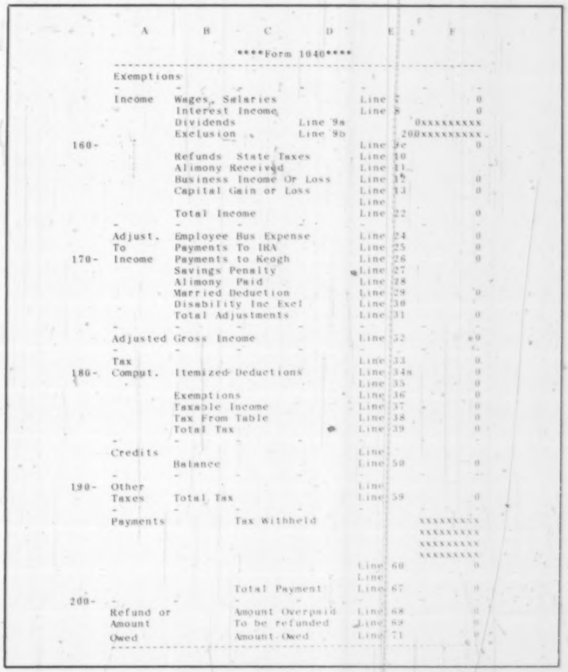
Figure 3. Schedule W.

Figure 4. Schedule D.



```
             A        B         C         D        E          F         G         H

                       **Schedule D Capital Gains And Losses**
         --------------------------------------------------------------------------
         Part I   Short term gains and losses
         Kind of Property  Date Acq Date Sold Sales Pr     Cost      Loss       Gain
  110-                                                                  0          0
                                                                        0          0
                                                                        0          0
                                                                        0          0
                                                                        0          0
                                                                        0          0
                                                                        0          0
                                     Sub-Total         Line D1          0          0
                           Gain from sale of Res.      Line D2a xxxxxxxxx
                           Gain from install. sales    Line D2b xxxxxxxxx
  120-                     Gain from partnership       Line D3
                                     Sub-total         Line D4          0          0
                           Net Gain or Loss                     Line D5            0
                           Short-term Carryover                 Line D6
                           Net Short-Term Gain Or Loss          Line D7            0
         -       -         -         -        -        -        -         -        -
         Part II  Long Term Gains and losses
         Kind of Property  Date Acq Date Sold Sales Pr     Cost      Loss       Gain
                                                                        0          0
                                                                        0          0
  130-                                                                  0          0
                                                                        0          0
                                                                        0          0
                                                                        0          0
                                                       Line D8          0          0
                           Gain from sale of res.      Line D9a xxxxxxxxx
                           Gain from install. sales    Line D9b xxxxxxxxx
                           Gain from partnership       Line D10
                                     Sub-total         Line D11         0          0
                           Net Gain or Loss                     Line D12           0
  140-                     Capital Gain Dist.                   Line D13
                           Sub-Total                            Line D16           0
                           Long-Term Carryover                  Line D17
                           Net Long-Term Gain or Loss           Line D18           0
         -       -         -         -        -        -        -         -        -
         Part III Summary of Parts I and II                     Line D19           0
                                                                Line D20           0
                                                                Line D21           0
                           Net Capital Gain                     Line D22           0
                                                                Line D23           0
  150-                     Net Capital Loss                     Line D24           0
         --------------------------------------------------------------------------
```

Figure 5. Form 1040.



```
             A         B         C         D         E         F

                              ****Form 1040****
          --------------------------------------------------------
          Exemptions
          -         -         -         -         -         -         -
          Income    Wages, Salaries               Line 7              0
                     Interest Income              Line 8              0
                     Dividends          Line 9a               0xxxxxxxxx
                     Exclusion          Line 9b             200xxxxxxxxx
  160-                                            Line 9c             0
                    Refunds  State Taxes          Line 10
                    Alimony Received              Line 11
                    Business Income Or Loss       Line 12             0
                    Capital Gain or Loss          Line 13             0
                                                  Line
                    Total Income                  Line 22             0
          -         -         -         -         -         -         -
          Adjust.   Employee Bus Expense          Line 24             0
          To        Payments To IRA               Line 25             0
  170-    Income    Payments to Keogh             Line 26             0
                    Savings Penalty               Line 27
                    Alimony  Paid                 Line 28
                    Married Deduction             Line 29             0
                    Disability Inc Excl           Line 30
                    Total Adjustments             Line 31             0
          -         -         -         -         -         -         -
          Adjusted Gross Income                   Line 32             0
          -         -         -         -         -         -         -
          Tax                                     Line 33             0
  180-    Comput.   Itemized Deductions           Line 34a            0
                                                  Line 35             0
                    Exemptions                    Line 36             0
                    Taxable Income                Line 37             0
                    Tax From Table                Line 38             0
                    Total Tax                     Line 39             0
          -         -         -         -         -         -         -
          Credits                                 Line
                    Balance                       Line 50             0
          -         -         -         -         -         -         -
  190-    Other                                   Line
          Taxes     Total Tax                     Line 59             0
          -         -         -         -         -         -         -
          Payments            Tax Withheld                  xxxxxxxxx
                                                            xxxxxxxxx
                                                            xxxxxxxxx
                                                            xxxxxxxxx
                                                  Line 60             0
                                                  Line
                              Total Payment       Line 67             0
  200-    -         -         -         -         -         -         -
          Refund or           Amount Overpaid     Line 68             0
          Amount              To be refunded      Line 69             0
          Owed                Amount Owed         Line 71             0
          --------------------------------------------------------
```

ments is to override whatever global format is invoked. Be sure to enter these as formats, not formulas.

Figure 6. Formula listing.

```
FORMULA LISTING FOR VC FILE "TAXFORM/VC"


>F4:.01*F179
>F5:@IF(F4>F3,0,F3-F4)
>F10:@SUM(F5...F9)
>F11:.03*F179
>F12:@IF(F11>F10,0,F10-F11)
>F13:@IF(F6<300,.5*F6,150)
>F14:@IF(F13>F12,F13,F12)
>F18:@IF(F179<38001,0,360+(@INT((F179+@IF(E159>E158,E158,E159)+F67+F10
  4-35001)/5000)*18))
>F21:@SUM(F16...F20)
>F29:@SUM(F26...F28)
>F30:+F23+F24+F25+F29
>F36:@SUM(F32...F35)
>F44:@SUM(F41...F43)
>F45:+F38+F39+F40+F44
>F47:+F14+F21+F30+F36+F45
>F49:@IF(F47>F48,F47-F48,0)
>F62:+F53+@SUM(F55...F61)
>F64:+F63
>F66:2000-F65
>F67:@IF(F64<F66,F64,F66)
>F68:+F64-F67
>F69:+F62+F68
>F80:@SUM(F72...F79)
>F84:@SUM(E81...E83)
>F85:+F80-F84
>E94:@SUM(E90...E93)
>F94:@SUM(F90...F93)
>E96:+E94+E95
>F96:+F94+E95
>E100:@SUM(E97...E99)
>F100:@SUM(F97...F99)
>E101:+E96-E100
>F101:+F96-F100
>F102:@IF(E101<F101,@IF(E101<30000,E101,30000),@IF(F101<30000,F101,300
  00))
>F103:/FG.05
>F104:+F102*F103
>G110:@IF(E110<F110,E110-F110,0)
>H110:@IF(E110>F110,E110-F110,0)
>G111:@IF(E111<F111,E111-F111,0)
>H111:@IF(E111>F111,E111-F111,0)
>G112:@IF(E112<F112,E112-F112,0)
>H112:@IF(E112>F112,E112-F112,0)
>G113:@IF(E113<F113,E113-F113,0)
>H113:@IF(E113>F113,E113-F113,0)
>G114:@IF(E114<F114,E114-F114,0)
>H114:@IF(E114>F114,E114-F114,0)
>G115:@IF(E115<F115,E115-F115,0)
>H115:@IF(E115>F115,E115-F115,0)
>G116:@IF(E116<F116,E116-F116,0)
>H116:@IF(E116>F116,E116-F116,0)
>G117:@SUM(G110...G116)
>H117:@SUM(H110...H116)
>G121:@SUM(G117...G120)
>H121:@SUM(H117...H120)
>H122:+G121+H121
>H124:+H122+H123
>G128:@IF(E128<F128,E128-F128,0)
>H128:@IF(E128>F128,E128-F128,0)
>G129:@IF(E129<F129,E129-F129,0)
>H129:@IF(E129>F129,E129-F129,0)
>G130:@IF(E130<F130,E130-F130,0)
>H130:@IF(E130>F130,E130-F130,0)
>G131:@IF(E131<F131,E131-F131,0)
>H131:@IF(E131>F131,E131-F131,0)
>G132:@IF(E132<F132,E132-F132,0)
>H132:@IF(E132>F132,E132-F132,0)
>G133:@IF(E133<F133,E133-F133,0)
>H133:@IF(E133>F133,E133-F133,0)
>G134:@SUM(G128...G133)
>H134:@SUM(H128...H133)
>G138:@SUM(G134...G137)
>H138:@SUM(H134...H137)
>H139:+G138+H138
>H141:@SUM(H139...H140)
>H143:+H141+H142
>H145:+H124+H143
>H146:@IF(H145>0,@IF(H143<H145,@IF(H143>0,H143,0),H145),0)
>H147:.6*H146
>H148:@IF(H145>0,H145-H147,0)
>H149:@IF(H145<0,@IF(H124>=0,.5*H145,@IF(H143>=0,H145,H124+(.5*H143)))
  ,0)
>H150:@IF(-H149>3000,-3000,H149)
>F154:/FI
>F156:+E94+F94
>F157:+F69
>E158:+F85
>F160:@IF(E158>200,E158-200,0)
>F163:+E95+F95
>F164:+H148+H150
>F166:@SUM(F156...F165)
>F168:+E98+F98
>F169:+E97+F97
>F170:+E99+F99
>F173:+F104
>F175:@SUM(F168...F174)
>F177:+F166-F175
>F179:+F177
>F180:+F49
>F181:+F179-F180
>F182:+F154*1000
>G182:+F181-F182
>H182:@IF(G182>50000,G182,@INT((G182-1)/50)*50+25)
>F183:+F181-F182
>G183:@IF(H182>11900,@IF(H182>16000,@IF(H182>20200,(H182-20200)*.25+29
  37,(H182-16000)*.22+2013),(H182-11900)*.19+1234),0)
>H183:@IF(H182>24600,@IF(H182>29900,@IF(H182>35200,(H182-35200)*.39+73
  23,(H182-29900)*.33+5574),(H182-24600)*.29+4037),G183)
>F184:@IF(H182>45800,@IF(H182>60000,@IF(H182>85600,(H182-85600)*.5+302
  49,(H182-60000)*.49+17705),(H182-45800)*.44+11457),H183)
>F185:+F184
>F188:+F185-F187
>F191:+F188+F190
>F197:@SUM(E193...E196)
>F199:+F197+F198
>F201:@IF(F199>F191,F199-F191,0)
>F202:-F201
>F203:@IF(F191>F199,F191-F199,0)
```

Using The Program

The program should be easy to use for anyone familiar with *VisiCalc*. If a cell is blank, then you must enter data if it is appropriate for your particular situation. Set the recalculation mode to manual so you won't have to wait after each value is entered. If a cell contains a formula, then the value will be calculated by the program. Rows of x's are used in some places for clarity and indicate that no data are to be entered in that cell. Figure 8 shows a completed set of forms.

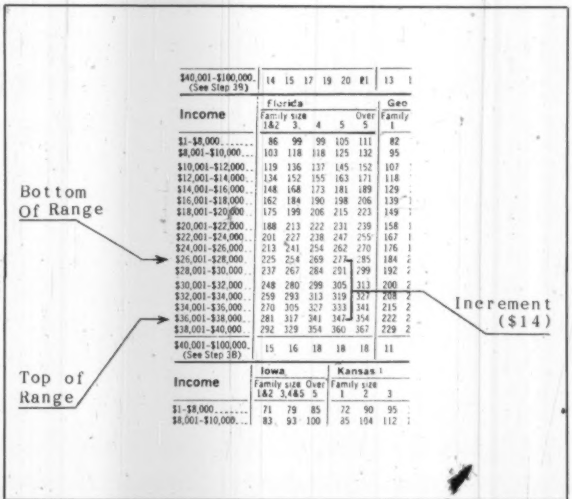
The data may be entered in any order, but error messages may appear or some cells may have incorrect values if data are missing. The convoluted nature of the forms and the interdependence of the calculations make it impossible to calculate all of the cells correctly in one pass. Two or three passes may be required, depending on the particular entries you use. *VisiCalc* flags the incorrect cells with the error message on the initial load, but after that no indication is given that more than one pass is required. One way to be sure is to look at the cell containing the tax owed and recalculate until the amount is the same twice in succession.

***The program should be easy to use for anyone familiar with* VisiCalc.**

Wages, IRA deductions, self-employment income, employee business expense, and Keogh payments are entered on Form W because they must be listed separately for the husband and wife. The program combines these inputs and enters the amount in the appropriate place on Form 1040. If you are single, you may still enter the data there. The program sets the married couple deduction to zero if income is not entered in both columns. Or you may delete Schedule W and the corresponding formulas in Form 1040 and enter the data there.

The data for schedules A and B are entered in much the same way as on the real forms. Make sure you change the number in cell F48 (Line A29) to match your filing status. The program automatically calculates the medical exclusions and the remaining All-Savers Exclusion. Schedule D is laid out in the same format as the real form. The program calculates all the entries except the information pertaining to the actual trans-

Figure 7. Derivation of sales tax parameters for use in formula F18.



$40,001-$100,000 (See Step 3B)	14	15	17	19	20	21	13

Income	Florida Family size 1&2	3	4	5	Over 5	Geo Family 1
$1-$8,000	86	99	99	105	111	82
$8,001-$10,000	103	118	118	125	132	95
$10,001-$12,000	119	136	137	145	152	107
$12,001-$14,000	134	152	155	163	171	118
$14,001-$16,000	148	168	173	181	189	129
$16,001-$18,000	162	184	190	198	206	139
$18,001-$20,000	175	199	206	215	223	149
$20,001-$22,000	188	213	222	231	239	158
$22,001-$24,000	201	227	238	247	255	167
$24,001-$26,000	213	241	254	262	270	176
$26,001-$28,000	225	254	269	277	285	184
$28,001-$30,000	237	267	284	291	299	192
$30,001-$32,000	248	280	299	305	313	200
$32,001-$34,000	259	293	313	319	327	208
$34,001-$36,000	270	305	327	333	341	215
$36,001-$38,000	281	317	341	347	354	222
$38,001-$40,000	292	329	354	360	367	229
$40,001-$100,000 (See Step 3B)	15	16	18	18	18	11

Income	Iowa Family size 1&2	3,4&5	Over 5	Kansas Family size 1	2	3
$1-$8,000	71	79	85	72	90	95
$8,001-$10,000	83	93	100	85	104	112

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actions. Form 1040 is largely automatic. You have to enter the number of exemptions, additional adjustments or income, and the amount of tax withheld. Some lines were omitted from this form, but blank lines are provided to enter additional lines if you need them.

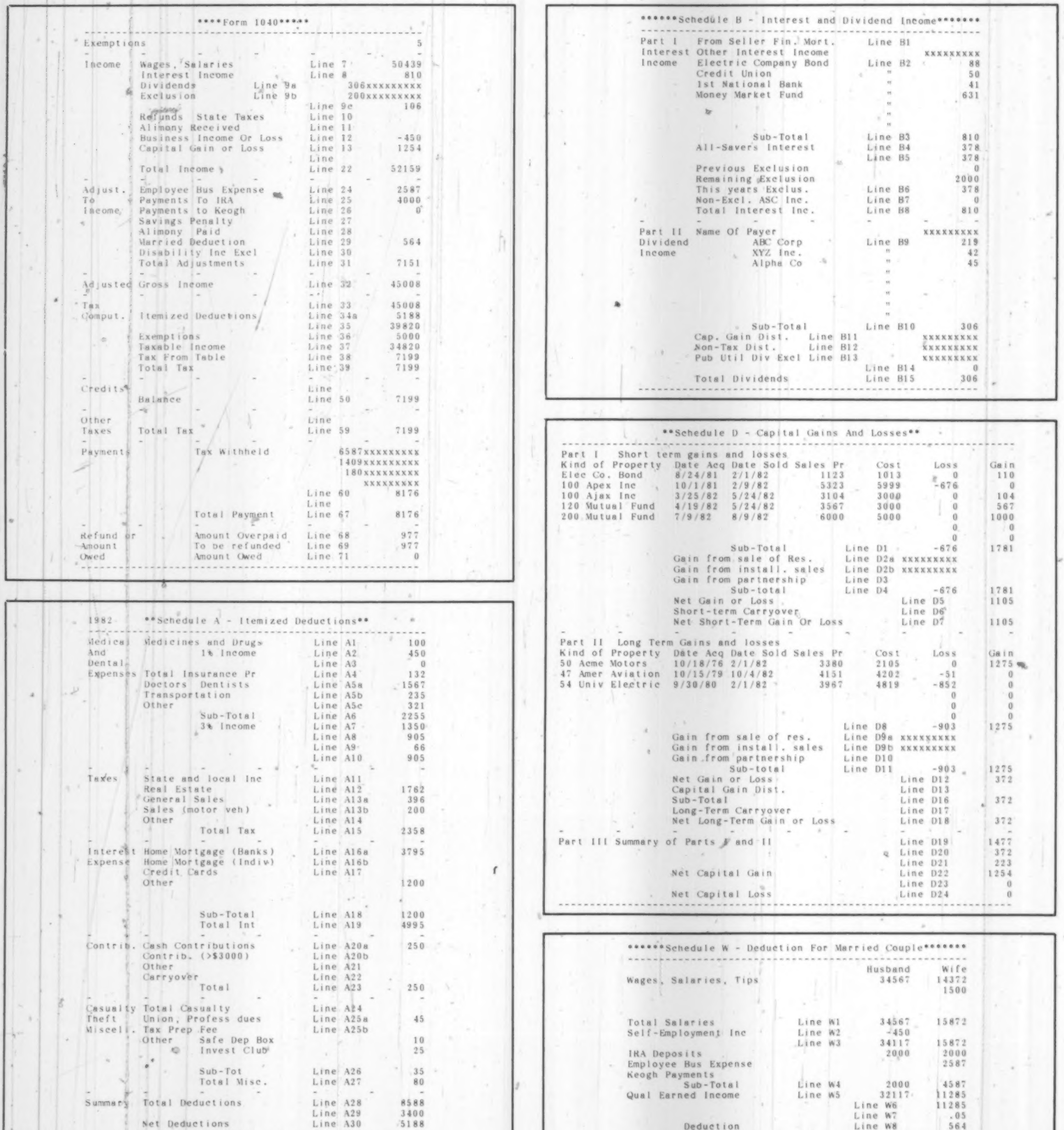
The global format command can be used to display the data in either dollars and cents or rounded to the nearest dollar.

Updating The Program

The example shown and all of the formulas are set up for the 1982 tax laws. For 1983 the number in cell F103 will change to .1 from .05. If the sales tax tables change, the formula in cell F18 will change. The tax cut, if there is one, will change G183, H183, and F184. There may be other changes that I am not aware of. Read the instructions just as carefully as you would if you were calculating by hand.

A final word of caution. I have checked the program carefully, and it seems to work for my particular circumstances, but I strongly advise that you check your results by hand until you are sure it is working for you. END

Figure 8. Completed tax forms.



```
                    ****Form 1040*****
 ----------------------------------------------------------
 Exemptions                                               5
 -         -          -          -         -      -       -
 Income     Wages, Salaries              Line 7       50439
            Interest Income              Line 8         810
            Dividends         Line 9a         306xxxxxxxxx
            Exclusion         Line 9b         200xxxxxxxxx
                                         Line 9c        106
            Refunds  State Taxes         Line 10
            Alimony Received             Line 11
            Business Income Or Loss      Line 12       -450
            Capital Gain or Loss         Line 13       1254
                                         Line
            Total Income                 Line 22      52159
 -          -         -          -       -        -       -
 Adjust.    Employee Bus Expense         Line 24       2587
 To         Payments To IRA              Line 25       4000
 Income     Payments to Keogh            Line 26          0
            Savings Penalty              Line 27
            Alimony  Paid                Line 28
            Married Deduction            Line 29        564
            Disability Inc Excl          Line 30
            Total Adjustments            Line 31       7151
 -          -         -          -       -        -       -
 Adjusted Gross Income                   Line 32      45008
 -          -         -          -       -        -       -
 Tax                                     Line 33      45008
 Comput.    Itemized Deductions          Line 34a      5188
                                         Line 35      39820
            Exemptions                   Line 36       5000
            Taxable Income               Line 37      34820
            Tax From Table               Line 38       7199
            Total Tax                    Line 39       7199
 -          -         -          -       -        -       -
 Credits                                 Line
            Balance                      Line 50       7199
 -          -         -          -       -        -       -
 Other                                   Line
 Taxes      Total Tax                    Line 59       7199
 -          -         -          -       -        -       -
 Payments             Tax Withheld             6587xxxxxxxxx
                                               1409xxxxxxxxx
                                                180xxxxxxxxx
                                                   xxxxxxxxx
                                         Line 60       8176
                                         Line
                      Total Payment      Line 67       8176
 -          -         -          -       -        -       -
 Refund or            Amount Overpaid    Line 68        977
 Amount               To be refunded     Line 69        977
 Owed                 Amount Owed        Line 71          0
 ----------------------------------------------------------
```

```
 1982    **Schedule A - Itemized Deductions**
 ----------------------------------------------------------
 Medical   Medicines and Drugs            Line A1        100
 And                 1% Income            Line A2        450
 Dental                                   Line A3          0
 Expenses  Total Insurance Pr             Line A4        132
           Doctors  Dentists              Line A5a      1567
           Transportation                 Line A5b       235
           Other                          Line A5c       321
                     Sub-Total            Line A6       2255
                     3% Income            Line A7       1350
                                          Line A8        905
                                          Line A9         66
                                          Line A10       905
 -         -         -         -          -       -        -
 Taxes     State and local Inc            Line A11
           Real Estate                    Line A12      1762
           General Sales                  Line A13a      396
           Sales (motor veh)              Line A13b      200
           Other                          Line A14
                     Total Tax            Line A15      2358
 -         -         -         -          -       -        -
 Interest  Home Mortgage (Banks)          Line A16a     3795
 Expense   Home Mortgage (Indiv)          Line A16b
           Credit Cards                   Line A17
           Other                                        1200


                     Sub-Total            Line A18      1200
                     Total Int            Line A19      4995
 -         -         -         -          -       -        -
 Contrib.  Cash Contributions             Line A20a      250
           Contrib. (>$3000)              Line A20b
           Other                          Line A21
           Carryover                      Line A22
                     Total                Line A23       250
 -         -         -         -          -       -        -
 Casualty  Total Casualty                 Line A24
 Theft     Union, Profess dues            Line A25a       45
 Miscell.  Tax Prep Fee                   Line A25b
           Other     Safe Dep Box                         10
                     Invest Club                          25

                     Sub-Tot              Line A26        35
                     Total Misc.          Line A27        80
 -         -         -         -          -       -        -
 Summary   Total Deductions               Line A28      8588
                                          Line A29      3400
           Net Deductions                 Line A30      5188
 ----------------------------------------------------------
```

```
 ******Schedule B - Interest and Dividend Income*******
 -------------------------------------------------------
 Part I   From Seller Fin. Mort.     Line B1
 Interest Other Interest Income               xxxxxxxxx
 Income   Electric Company Bond      Line B2         88
          Credit Union                  "            50
          1st National Bank             "            41
          Money Market Fund             "           631
                                        "
                                        "
                                        "
               Sub-Total             Line B3        810
          All-Savers Interest        Line B4        378
                                     Line B5        378
          Previous Exclusion                          0
          Remaining Exclusion                      2000
          This years Exclus.         Line B6        378
          Non-Excl. ASC Inc.         Line B7          0
          Total Interest Inc.        Line B8        810
 -        -      -       -           -       -       -
 Part II  Name Of Payer                       xxxxxxxxx
 Dividend      ABC Corp              Line B9        219
 Income        XYZ Inc.                 "            42
               Alpha Co                 "            45
                                        "
                                        "
                                        "
                                        "
               Sub-Total             Line B10       306
          Cap. Gain Dist.   Line B11          xxxxxxxxx
          Non-Tax Dist.     Line B12          xxxxxxxxx
          Pub Util Div Excl Line B13          xxxxxxxxx
                                     Line B14         0
          Total Dividends            Line B15       306
 -------------------------------------------------------
```

```
              **Schedule D - Capital Gains And Losses**
 -----------------------------------------------------------------------
 Part I   Short term gains and losses
 Kind of Property  Date Acq Date Sold Sales Pr     Cost      Loss     Gain
 Elec Co. Bond     8/24/81  2/1/82        1123     1013         0      110
 100 Apex Inc      10/1/81  2/9/82        5323     5999      -676        0
 100 Ajax Inc      3/25/82  5/24/82       3104     3000         0      104
 120 Mutual Fund   4/19/82  5/24/82       3567     3000         0      567
 200 Mutual Fund   7/9/82   8/9/82        6000     5000         0     1000
                                                                0        0
                                                                0        0
                        Sub-Total         Line D1            -676     1781
                   Gain from sale of Res.     Line D2a xxxxxxxxx
                   Gain from install. sales   Line D2b xxxxxxxxx
                   Gain from partnership      Line D3
                        Sub-total         Line D4            -676     1781
                   Net Gain or Loss                   Line D5         1105
                   Short-term Carryover               Line D6
                   Net Short-Term Gain Or Loss        Line D7         1105
 -      -          -      -      -        -           -       -         -
 Part II  Long Term Gains and losses
 Kind of Property  Date Acq Date Sold Sales Pr     Cost      Loss     Gain
 50 Acme Motors    10/18/76 2/1/82        3380     2105         0     1275
 47 Amer Aviation  10/15/79 10/4/82       4151     4202       -51        0
 54 Univ Electric  9/30/80  2/1/82        3967     4819      -852        0
                                                                0        0
                                                                0        0
                                                                0        0
                                          Line D8            -903     1275
                   Gain from sale of res.     Line D9a xxxxxxxxx
                   Gain from install. sales   Line D9b xxxxxxxxx
                   Gain from partnership      Line D10
                        Sub-total         Line D11           -903     1275
                   Net Gain or Loss                   Line D12         372
                   Capital Gain Dist.                 Line D13
                   Sub-Total                          Line D16         372
                   Long-Term Carryover                Line D17
                   Net Long-Term Gain or Loss         Line D18         372
 -      -          -      -      -        -           -       -         -
 Part III Summary of Parts I and II                   Line D19        1477
                                                      Line D20         372
                                                      Line D21         223
                   Net Capital Gain                   Line D22        1254
                                                      Line D23           0
                   Net Capital Loss                   Line D24           0
 -----------------------------------------------------------------------
```

```
 ******Schedule W - Deduction For Married Couple*******
 -----------------------------------------------------
                                          Husband    Wife
 Wages, Salaries, Tips                      34567   14372
                                                     1500


 Total Salaries              Line W1        34567   15872
 Self-Employment Inc         Line W2         -450
                             Line W3        34117   15872
 IRA Deposits                                2000    2000
 Employee Bus Expense                                2587
 Keogh Payments
      Sub-Total              Line W4         2000    4587
 Qual Earned Income          Line W5        32117   11285
                                   Line W6          11285
                                   Line W7            .05
      Deduction                    Line W8            564
 -----------------------------------------------------
```

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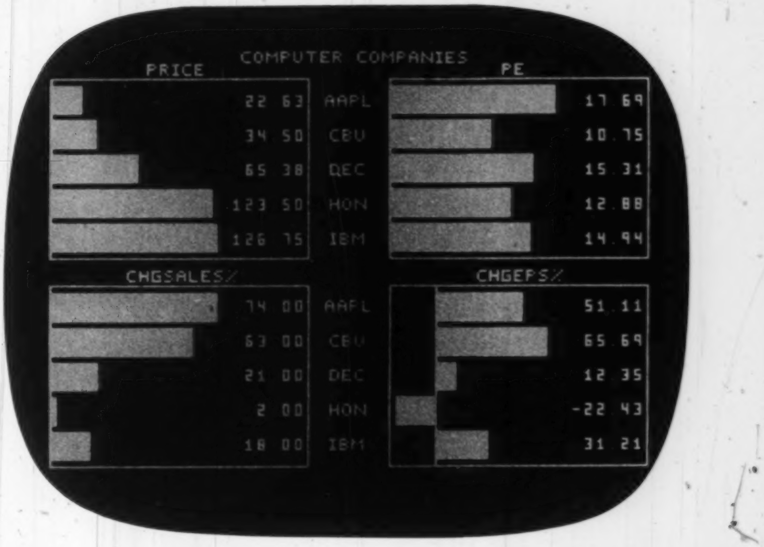

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Short Programs

ACRS Depreciation For Apple

Alfred Samper

The following is a translation for use on the Apple computer of Linda and Sid Broudy's ACRS Depreciation Program written for the IBM Personal Computer which appeared in the February 1983 *Creative Computing*.

For those who do not have a printer, the lines 855, 856, 857, 985 and 986 should be deleted. This will allow the printout to be displayed on the screen. END

Alfred Samper, 1316 N. Cross St., Wheaton, IL 60187.

```
10  REM --ACRS PROGRAM
20  REM --BY L. AND S. BROUDY
25  REM --SEPT.1982
30 N = 1
40  HOME : HTAB 8: INVERSE : PRINT  TAB( 7)"DEPRECIATION (ACRS) PROGRAM": NORMAL
50  VTAB (4): INPUT "WOULD YOU LIKE TO READ DATA FROM DISK (Y/N)";ANS$
60  IF AN$ = "Y" THEN 710
70  IF AN$ = "N" THEN S = 1
80  REM  --INSERTING NEW INFORMATION
90  INPUT "PLEASE TYPE IN YOUR NAME,AND YOUR SOCIAL SECURITY NUMBER(NAME,S
     S#)";NM$,SS$
100  INPUT "ITEM:";IT$(N)
110  PRINT "IS THE RECOVERY PERIOD FOR:";IT$(N)
112  PRINT  TAB( 12)"3 YRS, 5 YRS, OR 10 YRS";: INPUT C(N)
115  IF C(N) = 3 OR C(N) = 5 OR C(N) = 10 THEN  GOTO 120
117  GOTO 110
120  INPUT "UNADJUSTED BASIS:";BP(N)
130  INPUT "DATE PLACED IN SERVICE:";S$(N)
140  INPUT "% USED FOR BUSINESS:";B(N)
150  INPUT "DEPRECIATION YEAR (1,2,ETC.)";Y
160  IF C(N) = 3 THEN  GOSUB 410
```

Continued on page 188.

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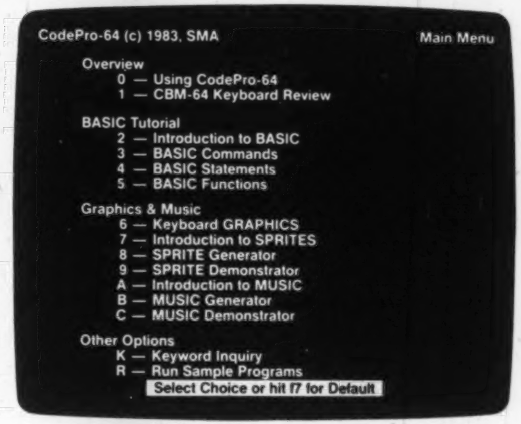

```
CodePro-64 (c) 1983, SMA                    Main Menu
      Overview
          0 — Using CodePro-64
          1 — CBM-64 Keyboard Review
      BASIC Tutorial
          2 — Introduction to BASIC
          3 — BASIC Commands
          4 — BASIC Statements
          5 — BASIC Functions
      Graphics & Music
          6 — Keyboard GRAPHICS
          7 — Introduction to SPRITES
          8 — SPRITE Generator
          9 — SPRITE Demonstrator
          A — Introduction to MUSIC
          B — MUSIC Generator
          C — MUSIC Demonstrator
      Other Options
          K — Keyword Inquiry
          R — Run Sample Programs
               Select Choice or hit f7 for Default
```

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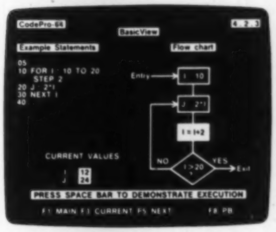
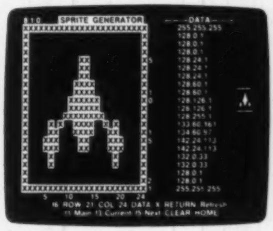


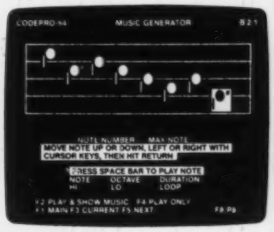
```
05
10 FOR I = 10 TO 20
    STEP 2
20 J = 2*I
30 NEXT I
40
```

```
I  12
J  24
PRESS SPACE BAR TO DEMONSTRATE EXECUTION
F1 MAIN F3 CURRENT F5 NEXT          F8 PB
```

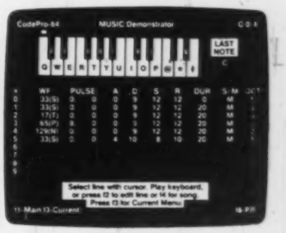


```
---DATA---
255.255.255
128.0.1
128.0.1
128.0.1
128.24.1
128.24.1
128.24.1
128.60.1
128.60.1
128.126.1
128.126.1
128.255.1
133.60.161
134.60.97
142.24.113
142.24.113
132.0.33
132.0.33
128.0.1
128.0.1
255.255.255
```

```
f6 ROW 21 COL 24 DATA X RETURN Refresh
f1 Main f3 Current f5 Next CLEAR HOME
```



```
MOVE NOTE UP OR DOWN, LEFT OR RIGHT WITH
CURSOR KEYS, THEN HIT RETURN
PRESS SPACE BAR TO PLAY NOTE
NOTE      OCTAVE      DURATION
HI        LO          LOOP
F2 PLAY & SHOW MUSIC   F4 PLAY ONLY
F1 MAIN F3 CURRENT F5 NEXT              F8 PB
```



```
#   WF      PULSE    A   D   S   R   DUR  S/M  OCT
0   33(S)   0.   0   0   9   12  12  0    M
1   33(S)   0.   0   0   9   12  12  20   M
2   17(T)   0.   0   0   9   12  12  20   M
3   65(P)   8.   0   0   3   12  12  20   M
4   129(N)  0.   0   0   9   12  12  20   M
5   33(S)   0.   0   4   10  8   10  20   M
6
7
8
9
          Select line with cursor. Play keyboard,
           or press f2 to edit line or f4 for song.
                Press f3 for Current Menu.
f1-Main f3-Current                          f8-PR
```

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CIRCLE 255 ON READER SERVICE CARD

ACRS Depreciation, continued...

```
170  IF C(N) = 5 THEN  GOSUB 470
180  IF C(N) = 10 THEN  GOSUB 530
190  INPUT "WOULD YOU LIKE A PRINTOUT (Y/N):";ANS$: IF ANS$ = "Y" THEN  GOSUB
     850
210  HOME : PRINT C(N)"-YEAR ACRS"
220  PRINT "COST RECOVERY FOR: ";IT$(N)
230  PRINT "UNADJUSTED BASIS:";: PRINT "$";BP(N)
240  PRINT : PRINT "DATE PLACED IN SERVICE: ";S$(N): PRINT "DEPRECIATION Y
     EAR:";Y
250  PRINT : PRINT "RATE OF ACRS DEPRECIATION:";100 * R;"%"
260 DEP = BP(N) * R
270 : PRINT "FULL ACRS DEPRECIATION AMT.=";: PRINT "$" DEP
280  PRINT "PERCENT OF USE FOR BUSINESS:";B(N);"%":B = .01 * B(N)
290 TD = B * DEP
300  PRINT : PRINT "ACRS DEPRECIATION DEDUCTION=";: PRINT "$";TD
310  INPUT "DO YOU WANT ANOTHER DEPRECIATION YEAR (Y/N)";A$
320  IF A$ = "Y" THEN  GOTO 150
330  IF A$ = "N" AND S = 1 THEN 370
340  INPUT "DO YOU WANT TO REVIEW ANOTHER ITEM FROM THE DISK  (Y/N)";A$
350  IF A$ = "Y" THEN 780
360  IF A$ = "N" THEN N = M
370  INPUT "DO YOU WANT TO ENTER ANOTHER ITEM  (Y/N)";AN$
380  IF AN$ = "Y" THEN N = N + 1:S = 1: GOTO 100
390  INPUT "DO YOU WANT TO SAVE YOUR DATA (Y/N)";A$
400  IF A$ = "Y" THEN 610
405  END
410  REM --3 YEAR ACRS
420  IF Y = 1 THEN R = .25
430  IF Y = 2 THEN R = .38
440  IF Y = 3 THEN R = .37
450  IF Y > 3 THEN  GOTO 150
460  RETURN
470  REM --5 YEAR ACRS
480  IF Y = 1 THEN R = .15
490  IF Y = 2 THEN R = .22
500  IF Y > 2 AND Y < 6 THEN R = .21
510  IF Y > 5 THEN  GOTO 150
520  RETURN
530  REM -- 10 YEAR ACRS
540  IF Y = 1 THEN R = .08
550  IF Y = 2 THEN R = .14
560  IF Y = 3 THEN R = .12
570  IF Y > 3 AND Y < 7 THEN R = .1
580  IF Y > 6 AND Y < 11 THEN R = .09
590  IF Y > 10 THEN  GOTO 150
600  RETURN
610  REM  --DISK ACCESS
620 M = N
630  INPUT "WHAT WOULD YOU LIKE TO NAME YOUR FILE:";F$
640  PRINT  CHR$ (4);"OPEN";F$ + ".TAX"
645  PRINT  CHR$ (4);"WRITE";F$ + ".TAX"
650  PRINT M;",";NM$;",";SS$
660  FOR I = 1 TO M
670  PRINT IT$(I);",";BP(I);",";S$(I);",";B(I);",";C(I)
680  NEXT I
690  PRINT  CHR$ (4);"CLOSE";F$ + ".TAX"
700  END
710  INPUT "WHAT FILE WOULD YOU LIKE TO READ:";F$
720  PRINT  CHR$ (4);"OPEN";F$ + ".TAX"
725  PRINT  CHR$ (4);"READ";F$ + ".TAX"
730  INPUT M,NM$,SS$
740  FOR I = 1 TO M
750  INPUT IT$(I),BP(I),S$(I),B(I),C(I)
760  NEXT I
770  PRINT  CHR$ (4);"CLOSE";F$ + ".TAX"
780  HOME : PRINT "ITEMS IN THE FILE ARE:"
790  FOR I = 1 TO M
800  PRINT I,IT$(I)
810  NEXT I
820  INPUT "WHICH ITEM WOULD YOU NOW LIKE TO REVIEW (ENTER ITEM# OR 0 FOR
     NEW ITEM)";I
830  PRINT IT$(I):N = I: IF I = 0 THEN N = M: GOTO 370
835  IF I <  = M THEN  GOTO 150
840  PRINT "THE ITEM YOU CHOOSE ISN'T IN THE FILE:": FOR K = 1 TO 1500: NEXT
     : GOTO 780
850  REM --PRINTER SUBROUTINE
855  PR# 1
856  POKE 1529,70
857  SPEED= 200
860  PRINT C(N)"-YEAR DEPRECIATION (ACRS) WORKSHEET"
870  PRINT NM$;".............SS#";SS$
880  PRINT
890  PRINT "COST RECOVERY FOR:";IT$(N)
900  PRINT
910  PRINT "UNADJUSTED BASIS:";: PRINT "$";BP(N)
920  PRINT "DATE PLACED IN SERVICE:";S$(N): PRINT "DEPRECIATION YEAR:";Y
930  PRINT "RATE OF ACRS DEPRECIATION:";100 * R;"%"
940 DEP = BP(N) * R
950  PRINT : PRINT "FULL ACRS DEPRECIATION AMT.=";: PRINT "$";DEP
960  PRINT "PERCENT OF USE FOR BUSINESS:";B(N);"%":B = .01 * B(N)
970 TD = B * DEP
980  PRINT : PRINT "ACRS DEPRECIATION DEDUCTION = ";: PRINT "$";TD: PRINT

985  PR# 0
986  SPEED= 255
990  GOTO 310
5010 AB(15): INPUT "WOULD YOU LIKE TO READ DATA FROM DISK (Y/N)";ANS$
```

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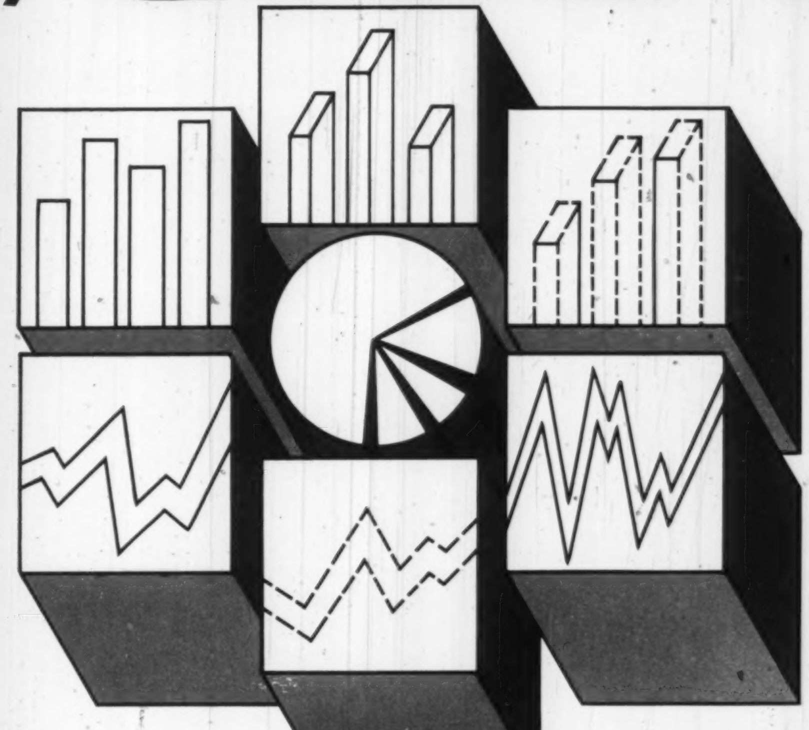

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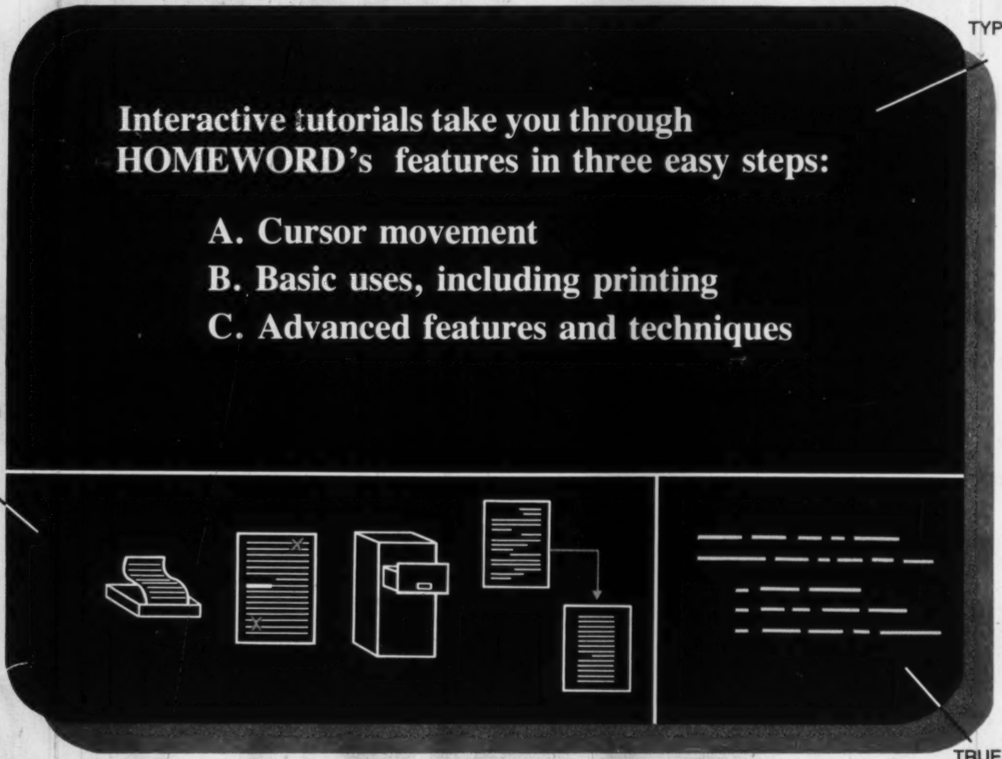

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CIRCLE 207 ON READER SERVICE CARD

The First One

Print Statement Formatter For Apple

M.J. Parrott

A look at a typical Basic program will convince you that, usually, between one quarter and one third of it is concerned with outputting text to the screen. This text is of two kinds; the first takes just a few lines of program and screen and occurs scattered throughout the length of the program. The second kind of text tends to occur in large chunks and is typically printed toward the beginning where it lists instructions or gives information.

This second kind of text is frustrating to incorporate into the program. It is usually added after the main body has been written and debugged and it is a real chore to get it concise (to save memory) and to get it correctly formatted for the screen. How many times have you typed in PRINT statements only to discover on running the program that you have words wrapping around on the screen or that the last word on a line goes right to the margin and forces an extra carriage return resulting in an untidy display? I have many times said and therefore thought that a utility which allowed you to type in text without worrying about wrap around and which then formatted this into lines of Basic, correctly formatted for the screen would be a great boon.

Searching around for such a utility to use on my Apple II proved a disappointment; I couldn't find one. So I wrote my own. I find it extremely useful and timesaving and hope that you will too. I called it the First One.

Using The Program

After BRUNning it from disk, type (RETURN) from Basic or CTRL-Y from the monitor to initiate the program. The screen clears ready for you to type your text. Any character that is visible on the screen may be typed; a double quote, however, appears on the screen as a single quote or apostrophe. Control characters (including the RETURN key) are, in general, ignored by the program, but a few enable the incorporation of extra commands into the Basic program which will be generated. These control characters are

- CTRL-F: This leaves a flashing question mark on the screen but forces the FLASH command to appear in the Basic.

The First One will translate about six screenfuls of text into lines of Basic.

- CTRL-I: This leaves an inverse question mark on the screen, but forces the INVERSE command to appear in the Basic.
- CTRL-N: This leaves a flashing > symbol on the screen, but forces the NORMAL command to appear in the Basic.
- CTRL-L: This forces a carriage return both on the screen and in the text of the PRINT statement to be generated. In the PRINT statement this will either be an ASCII code 13 embedded in the string or it may appear as the normal end of a PRINT statement where the double quote "followed by neither a comma nor a semi-colon causes a carriage return to be issued when the PRINT statement is executed.
- The backspace key: This causes the last character on the screen to disappear, the cursor to back up, and the last used byte of the buffer to be zeroed. This is used for correcting typing errors. Remember that if a command such as CTRL-N is erased, you may want to type it again. Take care to count characters if you back up over a CTRL-L (a carriage return) because it has been erased from the text buffer, but the characters on the screen are no longer erased.
- CTRL-E: This causes the program to exit this inputting stage and to convert the text to lines of Basic. After the Basic program has been formed, it is RUN so the finished text may be viewed.

The First One will translate about six screenfuls of text into lines of Basic, but does not incorporate lines to halt the printing of the text at appropriate points to give you time to read it. I did this deliberately, as the exact choice of statement to do this depends to some extent on the remainder of the program.

It is no effort to go through the lines adding the necessary appropriate line as required. Once the lines of Basic have been formed, they can be treated exactly as if they had been typed in by you, the user. I usually use RENUMBER on the lines to match them to and subsequently merge them with my main program.

The whole process of typing the text, renumbering the lines and merging them with the host program is very much quicker than writing lines of PRINT statements directly. The lines of Basic as written by the First One also are more

---

M.J. Parrott, 23 Brackley Rd., Heaton Chapel, Stockport, Cheshire, SK4 2QT, England.

compact than those written directly due to the incorporation of ASCII character 13 into the string rather than ending the string whenever the righthand margin of the screen is reached.

How It Works

I have presented the program The First One both as a source listing and as a hexadecimal dump. It was assembled to begin at $4000 and is in essentially three parts. The first sets up the ampersand and CTRL-Y vectors to point to the second part, then returns to the caller. The second clears a buffer starting at $5000 to zero bytes, clears the screen, and accepts keystrokes. These are checked to see if they are printable characters or are commands and if so are displayed on the screen and are put into the buffer. If the buffer is filled or on receipt of the exit command (CTRL-E), the third part of the program begins operation where the lines of Basic are formed beginning at $801 as normal.

This part of the program resets the pointers to the buffer (BUF) and to the area of memory used to assemble the Basic (BAS) and looks at the next byte to see if it is text or a command or a zero value, which indicates that the end of the text has been reached. If it is text, 40 characters from the buffer are taken and scanned forward, looking for commands other than a carriage return. If none are found, the 40 characters are scanned backward looking for the first space or carriage return to find a convenient point at which to break the line of text as it will appear on the screen.

When found, the characters in front of this point are converted to the corresponding ASCII code with the high bit off and are stored in the appropriate area of memory for the Basic. The BUF pointer is reset and the process is repeated.

A count of the number of characters appearing in a line of Basic is kept, and when it is more than 240 or when a command is found, the line of text (in the Basic) is finished off with the appropriate PRINT token, with the line number, with the double quotes which delimit the string, and with the link addresses. The process then returns to the start and begins again.

Finally, when the end is reached, a jump is made to the Applesoft routine (RUN, $D566) where the Basic program is run. If the last character in the buffer is a command such as CTRL-I, CTRL-F or, perhaps more likely, a CTRL-N, the final line of Basic will be a PRINT statement with nothing following. This can easily be deleted when the Basic is listed.

Other than RUN the First One uses only a few routines in the Apple monitor, most of which can probably be duplicated on other 6502 machines. These are (addresses and affected registers are in parentheses) CLS ($FC58,A,Y) which clears the screen and sets the cursor to the upper lefthand corner, GET ($FD35,A,X,Y) which takes a keystroke ASCII value into the accumulator, PRT ($FDED) which then prints the ASCII value of the accumulator on to the next possible position of the screen, BACK ($FC10,A) which moves the cursor back one place on the screen, and BEL ($FBE4,A,Y) which rings a bell.

Therefore, if you feel brave enough to translate the First One to another machine, it should be quite easy, providing the various pointers and Basic tokens are changed to the appropriate values. END

```
SOURCE FILE: FIRST ONE
----- NEXT OBJECT FILE NAME IS FIRST ONE.OBJ0
4000:                1           ORG  $4000
FC58:                2 CLS       EQU  $FC58
FD35:                3 GET       EQU  $FD35
FDED:                4 PRT       EQU  $FDED
FBE4:                5 BEL       EQU  $FBE4
FC10:                6 BACK      EQU  $FC10
D566:                7 RUN       EQU  $D566
0000:                8 BUF       EQU  $00
0002:                9 LIN       EQU  $02
0004:               10 LINK      EQU  $04
0006:               11 BAS       EQU  $06
0008:               12 FLAG      EQU  $08
000E:               13 TEMP      EQU  FLAG+6
0032:               14 VIDEO     EQU  $32
03F5:               15 AMPSND    EQU  $3F5
                    16 ********************
4000:               17 *
4000:               18 *THE FIRST ONE
4000:               19 *
                    20 ********************
4000:A9 4C          21           LDA  #$4C       ;SET UP VECTORS FOR
4002:8D F5 03       22           STA  AMPSND     ;& AND CTRL-Y
4005:8D F8 03       23           STA  AMPSND+3
4008:A9 23          24           LDA  #>ORIG
400A:8D F6 03       25           STA  AMPSND+1
400D:8D F9 03       26           STA  AMPSND+4
4010:A9 40          27           LDA  #<ORIG
4012:8D F7 03       28           STA  AMPSND+2
4015:8D FA 03       29           STA  AMPSND+5
4018:60             30           RTS
4019:C7 CE C9       31 TEXT      ASC  "GNIDOC   WON"
401C:C4 CF C3
401F:A0 D7 CF
4022:CE
4023:D8             32 ORIG      CLD
4024:A2 80          33           LDX  #$80
4026:A9 50          34           LDA  #$50       ;BUFFER POINTERS
4028:85 01          35           STA  BUF+1      ;HELD IN ZERO PAGE
402A:A9 00          36           LDA  #$00
402C:85 00          37           STA  BUF
402E:A8             38           TAY
402F:91 00          39 LOOP      STA  (BUF),Y    ;ZERO THE BUFFER
4031:88             40           DEY             ;PLUS ONE PAGE
4032:D0 FB          41           BNE  LOOP
4034:E6 01          42           INC  BUF+1
4036:E4 01          43           CPX  BUF+1
4038:B0 F5          44           BCS  LOOP
403A:20 58 FC       45           JSR  CLS        ;HOME
403D:A9 50          46           LDA  #$50       ;RESET BUFFER POINTERS
403F:85 01          47           STA  BUF+1
4041:20 35 FD       48 BEGIN     JSR  GET        ;GET A CHAR
4044:C9 9F          49           CMP  #$9F       ;START OF PRINTABLE CHARS
4046:90 1F          50           BCC  CTR
4048:C9 A2          51           CMP  #$A2       ;A QUOTE?
404A:D0 02          52           BNE  STP
404C:A9 A7          53           LDA  #$A7
404E:A0 00          54 STP       LDY  #$00
4050:91 00          55           STA  (BUF),Y    ;PUT IT IN BUFFER
4052:20 ED FD       56           JSR  PRT
4055:E6 00          57           INC  BUF        ;UPDATE BUF
4057:D0 E8          58           BNE  BEGIN
4059:E6 01          59           INC  BUF+1
405B:E4 01          60           CPX  BUF+1      ;END OF BUFFER?
405D:F0 02          61           BEQ  BELL
```

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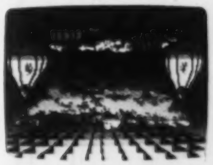

LENGTH
POSITION
VALUE
TEMPO
NOTE

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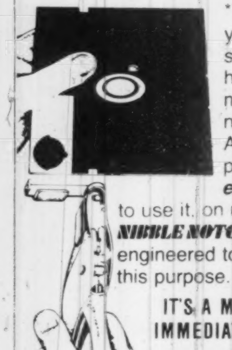

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CIRCLE 171 ON READER SERVICE CARD

The First One, continued...

```
405F:B0 E0                      BCS  BEGIN
4061:20 E4 FB       BELL        JSR  BEL
4064:4C CB 40                   JMP  END1        ;EXIT EDITOR
4067:C9 88          CTR         CMP  #$88        ;A <- ?
4069:D0 27                      BNE  CTR1
406B:38                         SEC
406C:A5 00                      LDA  BUF         ;RESET BUF
406E:E9 01                      SBC  #$01
4070:85 00                      STA  BUF
4072:A5 01                      LDA  BUF+1
4074:E9 00                      SBC  #$00
4076:85 01                      STA  BUF+1
4078:C9 50                      CMP  #$50        ;PAST START OF BUFFER?
407A:B0 03                      BCS  CONT
407C:4C 23 40                   JMP  ORIG        ;START AGAIN!
407F:A0 00          CONT        LDY  #$00
4081:98                         TYA
4082:91 00                      STA  (BUF),Y     ;ZERO BUFFER
4084:20 10 FC                   JSR  BACK
4087:A9 A0                      LDA  #$A0        ;A BLANK
4089:20 ED FD                   JSR  PRT
408C:20 10 FC                   JSR  BACK
408F:4C 41 40                   JMP  BEGIN
4092:C9 8C          CTR1        CMP  #$8C        ;CTRL-L
4094:D0 05                      BNE  CTR2
4096:A9 8D                      LDA  #$8D        ;CAR RETURN
4098:4C 4E 40                   JMP  STP         ;GO STORE IT
409B:C9 89          CTR2        CMP  #$89        ;CTRL-I
409D:D0 07                      BNE  CTR3
409F:A9 3F                      LDA  #$3F
40A1:85 32                      STA  VIDEO       ;INVERSE
40A3:4C 4E 40                   JMP  STP
40A6:C9 86          CTR3        CMP  #$86        ;CTRL-F
40A8:D0 07                      BNE  CTR4
40AA:A9 7F                      LDA  #$7F        ;FLASH
40AC:85 32                      STA  VIDEO
40AE:4C 4E 40                   JMP  STP
40B1:C9 8E          CTR4        CMP  #$8E        ;CTRL-N
40B3:D0 09                      BNE  CTR5
40B5:A9 FF                      LDA  #$FF
40B7:85 32                      STA  VIDEO
40B9:A9 7E                      LDA  #$7E
40BB:4C 4E 40                   JMP  STP
40BE:C9 85          CTR5        CMP  #$85        ;CTRL-E
40C0:F0 03                      BEQ  DOIT
40C2:4C 41 40                   JMP  BEGIN       ;GO BACK
40C5:A9 A0          DOIT        LDA  #$A0        ;A BLANK
40C7:A0 00                      LDY  #$00
40C9:91 00                      STA  (BUF),Y     ;LAST CHAR IS BLANK
40CB:20 58 FC       END1        JSR  CLS         ;HOME
40CE:A2 09                      LDX  #$9
40D0:BD 19 40       NOTE        LDA  TEXT,X
40D3:20 ED FD                   JSR  PRT
40D6:CA                         DEX
40D7:10 F7                      BPL  NOTE
40D9:20 E4 FB                   JSR  BEL
                    ********************
40DC:               *NOW FORM THE BASIC
                    ********************
40DC:A9 08                      LDA  #$08        ;RESET POINTERS ETC
40DE:85 07                      STA  BAS+1
40E0:85 05                      STA  LINK+1
40E2:85 02                      STA  LIN
40E4:85 68                      STA  $68         ;START OF PROG
40E6:A9 50                      LDA  #$50
40E8:85 01                      STA  BUF+1
40EA:A9 00                      LDA  #$00
40EC:85 00                      STA  BUF
40EE:85 09                      STA  FLAG+1      ;INIT CHAR COUNTER
40F0:85 0A                      STA  FLAG+2      ;FLAG FOR NO END
40F2:85 0B                      STA  FLAG+3      ;FLAG FOR COMMAND
40F4:85 0C                      STA  FLAG+4      ;FIRST LINE COMMAND?
40F6:85 03                      STA  LIN+1
40F8:A9 27                      LDA  #$27        ;COUNTER FOR SPACES
40FA:85 0D                      STA  FLAG+5      ;ON A SCREEN LINE
40FC:A9 07                      LDA  #$07
40FE:85 06                      STA  BAS         ;START OF TEXT
4100:A9 01                      LDA  #$01
4102:85 04                      STA  LINK
4104:85 67                      STA  $67         ;START OF PROG
4106:A0 00          START1      LDY  #$00
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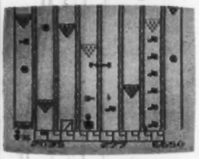

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The First One, continued...

```
4108:B1 00     143          LDA  (BUF),Y
410A:D0 07     144          BNE  GOON       ;IF NOT ZERO
410C:A9 01     145          LDA  #$01       ;SET FLAG FOR END
410E:85 0A     146          STA  FLAG+2     ;OF PROGRAM
4110:4C BF 41  147          JMP  LINE       ;FINISH THE LINE
4113:A9 80     148 GOON     LDA  #$80       ;LOOK FOR COMMANDS
4115:D1 00     149          CMP  (BUF),Y
4117:90 40     150          BCC  LOOK
4119:B1 00     151          LDA  (BUF),Y    ;STORE THE
411B:85 0B     152          STA  FLAG+3     ;COMMAND
411D:A5 0C     153          LDA  FLAG+4     ;IS IT 1ST LINE?
411F:D0 03     154          BNE  FINOLD
4121:4C 2C 41  155          JMP  FINNEW
4124:20 CA 41  156 FINOLD   JSR  CONT7
4127:A0 02     157          LDY  #$02       ;UPDATE BAS
4129:20 77 42  158          JSR  ADDON
412C:A0 05     159 FINNEW   LDY  #$05       ;MAKE A LINE FOR
412E:A9 00     160          LDA  #$00       ;THE COMMAND
4130:91 04     161          STA  (LINK),Y
4132:88        162          DEY
4133:A5 0B     163          LDA  FLAG+3     ;GET COMMAND
4135:C9 7E     164          CMP  #$7E
4137:F0 0A     165          BEQ  NORM
4139:90 04     166          BCC  INVER
413B:A9 9F     167          LDA  #$9F       ;FLASH TOKEN
413D:B0 06     168          BCS  TOKEN
413F:A9 9E     169 INVER    LDA  #$9E       ;INVERSE TOKEN
4141:90 02     170          BCC  TOKEN
4143:A9 9D     171 NORM     LDA  #$9D       ;NORMAL TOKEN
4145:91 04     172 TOKEN    STA  (LINK),Y   ;PUT TOKEN IN LINE
4147:20 15 42  173          JSR  TOK        ;GO & FINISH LINE
414A:A9 00     174          LDA  #$00       ;RESET FLAG
414C:85 0B     175          STA  FLAG+3
414E:A0 01     176          LDY  #$01
4150:20 69 42  177          JSR  UPDATE     ;UPDATE BUF BY 1
4153:20 77 42  178          JSR  ADDON      ;& BAS BY 2 IN TOTAL
4156:4C 06 41  179          JMP  START1
4159:C8        180 LOOK     INY
415A:84 0C     181          STY  FLAG+4
415C:C4 0D     182          CPY  FLAG+5     ;IE NO. OF  CHARS LEFT
415E:F0 15     183          BEQ  NONE       ;SEARCH FOR COMMANDS
4160:D1 00     184          CMP  (BUF),Y
4162:90 F5     185          BCC  LOOK
4164:88        186          DEY             ;SET IT BACK ONE
4165:84 08     187          STY  FLAG
4167:84 0E     188          STY  TEMP       ;RESET NO OF CHARS LEFT
4169:38        189          SEC             ;PER LINE
416A:A5 0D     190          LDA  FLAG+5
416C:E5 0E     191          SBC  TEMP
416E:E9 01     192          SBC  #$01       ;(Y COUNTS FROM 0)
4170:85 0D     193          STA  FLAG+5
4172:4C A3 41  194          JMP  LOOP2
4175:A4 0D     195 NONE     LDY  FLAG+5     ;IE NO. OF CHARS LEFT
4177:B1 00     196 SEARCH   LDA  (BUF),Y
4179:C9 A0     197          CMP  #$A0       ;LOOK FOR BLANKS
417B:F0 09     198          BEQ  CONT2      ;OR CAR RETURN
417D:C9 8D     199          CMP  #$8D
417F:F0 05     200          BEQ  CONT2
4181:88        201          DEY
4182:10 F3     202          BPL  SEARCH
4184:A4 0D     203          LDY  FLAG+5     ;NOT FOUND BLANK OR CR
4186:84 08     204 CONT2    STY  FLAG       ;TEMP STORAGE
4188:18        205          CLC
4189:98        206          TYA
418A:65 09     207          ADC  FLAG+1     ;ADD UP CHAR COUNTER
418C:B0 04     208          BCS  ENDIT      ;MORE THAN 255 CHARS
418E:C9 F0     209          CMP  #$F0       ;LESS THAN 240?
4190:90 06     210          BCC  CONT3
4192:20 BF 41  211 ENDIT    JSR  LINE
4195:4C 06 41  212          JMP  START1     ;GO BACK
4198:85 09     213 CONT3    STA  FLAG+1     ;UPDATE CHAR COUNTER
419A:A9 27     214          LDA  #$27       ;RESET LINE LENGTH
419C:85 0D     215          STA  FLAG+5     ;COUNTER
419E:A9 0D     216          LDA  #$D        ;PUT CR IN BASIC
41A0:91 06     217          STA  (BAS),Y
41A2:88        218          DEY
41A3:B1 00     219 LOOP2    LDA  (BUF),Y    ;GET A CHAR
41A5:C9 8E     220          CMP  #$8E       ;LOOK FOR CR
41A7:B0 06     221          BCS  PUTIT
41A9:A2 27     222          LDX  #$27       ;RESET LINE LENGTH
41AB:86 0D     223          STX  FLAG+5     ;COUNTER
41AD:84 08     224          STY  FLAG       ;IF CR RESET BUF & BAS
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41AF:49 80     PUTIT   EOR  #$80      ;STRIP OFF MSB
41B1:91 06             STA  (BAS),Y   ;PUT IN BASIC
41B3:88                DEY
41B4:10 ED             BPL  LOOP2
41B6:A4 08             LDY  FLAG      ;GET Y VALUE
41B8:C8                INY
41B9:20 69 42          JSR  UPDATE    ;UPDATE POINTERS
41BC:4C 06 41          JMP  START1    ;GO BACK
               *******************
41BF:          *LINE
               *******************
41BF:38        LINE    SEC
41C0:A5 06             LDA  BAS
41C2:E9 01             SBC  #$01
41C4:85 06             STA  BAS
41C6:B0 02             BCS  CONT7
41C8:C6 07             DEC  BAS+1
41CA:A9 22     CONT7   LDA  #$22      ;A QUOTE
41CC:A0 00             LDY  #$00
41CE:84 09             STY  FLAG+1    ;RESET CHAR COUNTER
41D0:91 06             STA  (BAS),Y   ;PUT IN FINAL "
41D2:A5 0B             LDA  FLAG+3    ;WHAT'S COMMAND
41D4:F0 29             BEQ  CARYON    ;IF NONE GO ON
41D6:A4 0D             LDY  FLAG+5    ;IE FOR NO OF CHARS LEFT
41D8:B1 00     LOOP3   LDA  (BUF),Y   ;SEARCH FOR BLANK
41DA:C9 A0             CMP  #$A0      ;OR CAR RET.
41DC:F0 0F             BEQ  FOUND
41DE:C9 8D             CMP  #$8D
41E0:F0 0B             BEQ  FOUND
41E2:88                DEY
41E3:10 F3             BPL  LOOP3
41E5:A9 27     IGNORE  LDA  #$27      ;RESET COUNTER FOR NO.
41E7:85 0D             STA  FLAG+5    ;OF CHARS PER LINE
41E9:A0 00             LDY  #$00
41EB:F0 12             BEQ  CARYON
41ED:C0 01     FOUND   CPY  #$01
41EF:D0 08             BNE  USE       ;IF IT ISN'T  FIRST CHAR PAST COMMAND
41F1:E6 00             INC  BUF       ;WE WANT TO SKIP THIS
41F3:D0 F0             BNE  IGNORE    ;BLANK NEXT TIME ROUND
41F5:E6 01             INC  BUF+1
41F7:D0 EC             BNE  IGNORE
41F9:A0 01     USE     LDY  #$01
41FB:A9 3B             LDA  #$3B      ;A ';'
41FD:91 06             STA  (BAS),Y
41FF:C8        CARYON  INY
4200:A9 00             LDA  #$00
4202:91 06             STA  (BAS),Y   PUT IN EOL TOKEN
4204:85 08             STA  FLAG      ;SET FLAG FOR FINISHED LINE
4206:C8                INY
4207:20 77 42          JSR  ADDON     ;UPDATE BAS
420A:A0 05             LDY  #$05      ;NOW FINISH LINE
420C:A9 22             LDA  #$22      ;A QUOTE
420E:91 04             STA  (LINK),Y  ;LINK POINTS TO THIS LINE'S START
4210:88                DEY
4211:A9 BA             LDA  #$BA      ;?TOKEN
4213:91 04             STA  (LINK),Y
4215:88        TOK     DEY
4216:A5 03             LDA  LIN+1     ;LINE NO HI BYTE
4218:91 04             STA  (LINK),Y
421A:88                DEY
421B:A5 02             LDA  LIN       ;LO BYTE OF LINE NO
421D:91 04             STA  (LINK),Y
421F:88                DEY
4220:A5 07             LDA  BAS+1     ;HI BYTE OF NEXT LINE
4222:91 04             STA  (LINK),Y
4224:88                DEY
4225:A5 06             LDA  BAS       ;LO BYTE OF NEXT LINE
4227:91 04             STA  (LINK),Y
4229:85 04             STA  LINK      ;RESET LINK FOR NEXT LINE
422B:A5 07             LDA  BAS+1
422D:85 05             STA  LINK+1
422F:A5 0B             LDA  FLAG+3    ;TEST FLAG FOR COMMAND
4231:F0 04             BEQ  LEAVE
4233:A0 04             LDY  #$04      ;SKIP 4 BYTES
4235:D0 02             BNE  ADD
4237:A0 06     LEAVE   LDY  #$06      ;HAVE TO SKIP 6 BYTES
4239:20 77 42  ADD     JSR  ADDON
423C:A5 0A             LDA  FLAG+2    ;TEST FLAG FOR END OF PROG
423E:F0 1D             BEQ  CONT8
4240:A0 00             LDY  #$00
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CIRCLE 212 ON READER SERVICE CARD

AD457

The First One, continued...

```
4242:98        305         TYA
4243:91 04     306         STA  (LINK),Y  ;ZERO BYTES FOR END
4245:C8        307         INY
4246:91 04     308         STA  (LINK),Y
4248:A0 03     309         LDY  #$03
424A:20 77 42  310         JSR  ADDON     ;ADJUST POINTER
424D:A5 06     311         LDA  BAS       ;POINTS TO PAST END
424F:85 AF     312         STA  $AF       ;END OF PROG POINTER
4251:A5 07     313         LDA  BAS+1
4253:85 B0     314         STA  $B0
4255:20 58 FC  315         JSR  CLS       ;HOME
4258:68        316         PLA            ;DISCARD TWO WORDS
4259:68        317         PLA            ;FROM STACK
425A:4C 66 D5  318         JMP  RUN       ;GO & RUN BASIC
425D:18        319 CONT8   CLC
425E:A9 05     320         LDA  #$05
4260:65 02     321         ADC  LIN       ;UPDATE LINE NUMBER
4262:85 02     322         STA  LIN
4264:90 02     323         BCC  CONT5
4266:E6 03     324         INC  LIN+1
4268:60        325 CONT5   RTS
               326 ********************
4269:          327 *UPDATE
               328 ********************
4269:98        329 UPDATE  TYA            ;UPDATE BUFFER
426A:18        330         CLC
426B:65 00     331         ADC  BUF
426D:85 00     332         STA  BUF
426F:90 02     333         BCC  CONT4
4271:E6 01     334         INC  BUF+1
4273:20 77 42  335 CONT4   JSR  ADDON
4276:60        336         RTS
               337 ********************
4277:          338 *ADDON
               339 ********************
4277:98        340 ADDON   TYA            ;UPDATE BAS
4278:18        341         CLC
4279:65 06     342         ADC  BAS
427B:85 06     343         STA  BAS
427D:90 02     344         BCC  CONT9
427F:E6 07     345         INC  BAS+1
4281:60        346 CONT9   RTS

** SUCCESSFUL ASSEMBLY: NO ERRORS


4277 ADDON        4239 ADD          03F5 AMPSND       FC10 BACK
  06 BAS          4041 BEGIN        FBE4 BEL          4061 BELL
  00 BUF          41FF CARYON       FC58 CLS          4186 CONT2
4198 CONT3        4281 CONT9        407F CONT         4273 CONT4
4268 CONT5        41CA CONT7        425D CONT8        4092 CTR1
40A6 CTR3         40B1 CTR4         4067 CTR          409B CTR2
40BE CTR5         40C5 DOIT         40CB END1         4192 ENDIT
412C FINNEW       4124 FINOLD         08 FLAG         41ED FOUND
FD35 GET          4113 GOON         41E5 IGNORE       413F INVER
4237 LEAVE          02 LIN          41BF LINE           04 LINK
4159 LOOK         41A3 LOOP2        41D8 LOOP3        402F LOOP
4175 NONE         4143 NORM         40D0 NOTE         4023 ORIG
FDED PRT          41AF PUTIT        D566 RUN          4177 SEARCH
4106 START1       404E STP            0E TEMP         4019 TEXT
4145 TOKEN        4215 TOK          4269 UPDATE       41F9 USE
  32 VIDEO


  00 BUF            02 LIN            04 LINK           06 BAS
  08 FLAG           0E TEMP           32 VIDEO        03F5 AMPSND
4019 TEXT         4023 ORIG         402F LOOP         4041 BEGIN
404E STP          4061 BELL         4067 CTR          407F CONT
4092 CTR1         409B CTR2         40A6 CTR3         40B1 CTR4
40BE CTR5         40C5 DOIT         40CB END1         40D0 NOTE
4106 START1       4113 GOON         4124 FINOLD       412C FINNEW
413F INVER        4143 NORM         4145 TOKEN        4159 LOOK
4175 NONE         4177 SEARCH       4186 CONT2        4192 ENDIT
4198 CONT3        41A3 LOOP2        41AF PUTIT        41BF LINE
41CA CONT7        41D8 LOOP3        41E5 IGNORE       41ED FOUND
41F9 USE          41FF CARYON       4215 TOK          4237 LEAVE
4239 ADD          425D CONT8        4268 CONT5        4269 UPDATE
4273 CONT4        4277 ADDON        4281 CONT9        D566 RUN
FBE4 BEL          FC10 BACK         FC58 CLS          FD35 GET
FDED PRT
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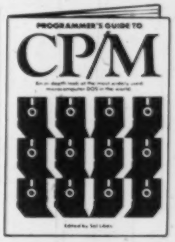

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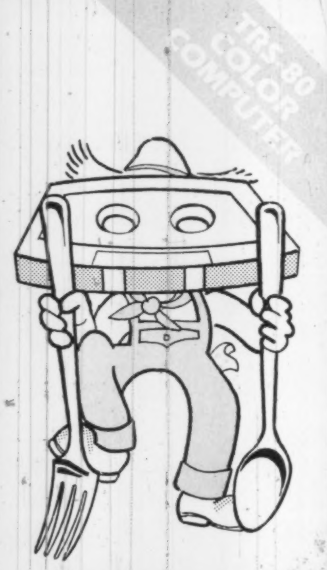

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4020- D7 CF CE D8 A2 80 A9 50
4028- 85 01 A9 00 85 00 A8 91
4030- 00 88 D0 FB E6 01 E4 01
4038- B0 F5 20 58 FC A9 50 85
4040- 01 20 35 FD C9 9F 90 1F
4048- C9 A2 D0 02 A9 A7 A0 00
4050- 91 00 20 ED FD E6 00 D0
4058- E8 E6 01 E4 01 F0 02 B0
4060- E0 20 E4 FB 4C CB 40 C9
4068- 88 D0 27 38 A5 00 E9 01
4070- 85 00 A5 01 E9 00 85 01
4078- C9 50 B0 03 4C 23 40 A0
4080- 00 98 91 00 20 10 FC A9
4088- A0 20 ED FD 20 10 FC 4C
4090- 41 40 C9 8C D0 05 A9 8D
4098- 4C 4E 40 C9 89 D0 07 A9
40A0- 3F 85 32 4C 4E 40 C9 86
40A8- D0 07 A9 7F 85 32 4C 4E
40B0- 40 C9 8E D0 09 A9 FF 85
40B8- 32 A9 7E 4C 4E 40 C9 85
40C0- F0 03 4C 41 40 A9 A0 A0
40C8- 00 91 00 20 58 FC A2 09
40D0- BD 19 40 20 ED FD CA 10
40D8- F7 20 E4 FB A9 08 85 07
40E0- 85 05 85 02 85 68 A9 50
40E8- 85 01 A9 00 85 00 85 09
40F0- 85 0A 85 0B 85 0C 85 03
40F8- A9 27 85 0D A9 07 85 06
4100- A9 01 85 04 85 67 A0 00
4108- B1 00 D0 07 A9 01 85 0A
4110- 4C BF 41 A9 80 D1 00 90
4118- 40 B1 00 85 0B A5 0C D0
4120- 03 4C 2C 41 20 CA 41 A0
4128- 02 20 77 42 A0 05 A9 00
4130- 91 04 88 A5 0B C9 7E F0
4138- 0A 90 04 A9 9F B0 06 A9
4140- 9E 90 02 A9 9D 91 04 20
4148- 15 42 A9 00 85 0B A0 01
4150- 20 69 42 20 77 42 4C 06
4158- 41 C8 84 0C C4 0D F0 15
4160- D1 00 90 F5 88 84 08 84
4168- 0E 38 A5 0D E5 0E E9 01
4170- 85 0D 4C A3 41 A4 0D B1
4178- 00 C9 A0 F0 09 C9 8D F0
4180- 05 88 10 F3 A4 0D 84 08
4188- 18 98 65 09 B0 04 C9 F0
4190- 90 06 20 BF 41 4C 06 41
4198- 85 09 A9 27 85 0D A9 0D
41A0- 91 06 88 B1 00 C9 8E B0
41A8- 06 A2 27 86 0D 84 08 49
41B0- 80 91 06 88 10 ED A4 08
41B8- C8 20 69 42 4C 06 41 38
41C0- A5 06 E9 01 85 06 B0 02
41C8- C6 07 A9 22 A0 00 84 09
41D0- 91 06 A5 0B F0 29 A4 0D
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41E8- 0D A0 00 F0 12 C0 01 D0
41F0- 08 E6 00 D0 F0 E6 01 D0
41F8- EC A0 01 A9 3B 91 06 C8
4200- A9 00 91 06 85 08 C8 20
4208- 77 42 A0 05 A9 22 91 04
4210- 88 A9 BA 91 04 88 A5 03
4218- 91 04 88 A5 02 91 04 88
4220- A5 07 91 04 88 A5 06 91
4228- 04 85 04 A5 07 85 05 A5
4230- 0B F0 04 A0 04 D0 02 A0
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High Precision Functions in Basic

Part 2

Albert Nijenhuis

In Part 1 (*Creative Computing*, December 1983) we provided Basic routines that would enable us to calculate EXP, SIN, and COS with high precision. In Part 2 we deal with SQR, LOG, ASN, and ATN. These functions are the inverses of the squaring function, of EXP, SIN, and TAN=SIN/COS, respectively.

Calculating SQR(Y) means finding a solution x of the equation $x^2 = y$. Assuming y is positive, there are two solutions, of opposite signs; we want the positive one. (If y is negative, there is no solution at all.)

To find LOG(Y) we solve the unknown x from the equation $e^x = y$; if y is positive, there is one solution, otherwise none.

Similarly, calculating ATN(Y) means finding a solution x of the equation tan x = y. Again, there is an infinite number of solutions, and we want the one between $-\pi/2$ and $\pi/2$, in radian measure.

Finally, calculating ASN(Y) means finding a solution x of the equation sin x = y. If y lies between -1 and 1, then there is an infinite number of solutions; we want the one that lies between $-\pi/2$ and $\pi/2$. (For other values of y there are no solutions.) We will reduce the calculation of ASN to that of ATN via the formula ASN(Y) = ATN(Y/SQR(1-Y*Y)).

Successive Approximations

The method by which we shall calculate inverse functions is a level more sophisticated than the infinite series we used in Part 1. This time the values are calculated by a method of successive approximations of a less transparent type. To appreciate these methods it is useful to be familiar with what is known as *Newton-Raphson*.

In fact, our method for SQR is just that, but the methods for LOG and ATN are more delicate and converge even faster; that is, they require fewer steps to achieve the desired accuracy. It may be useful to have a text on calculus or "pre-cal" handy to check some of the formulas.

High Accuracy

We shall use the infinite series expansions as follows:

$\ln(t) = (t-1) - (t-1)^2/2 + (t-1)^3/3 - \ldots.$

$\arctan(t) = t - t^3/3 + t^5/5 - t^7/7 + \ldots.$

Unfortunately, these series aren't nearly as nice as those in Part 1. First of all, they are not valid for all values of t: for ln (t), t must lie between 0 and 2, for arctan (t), t must lie between -1 and 1. Worse, however, unless t is quite close to the middle value (1 for ln (t), 0 for arctan (t)) many terms are required to obtain sufficient accuracy. All this is due to the absence of the rapidly increasing factorials in the denominators that we had before.

The required high accuracy will therefore be obtained by referring back to the high accuracy versions of the functions of which these are the inverses, together with the rather crude approximations obtained from the series above by using only two terms:

Function	Two-Term Approximation
ln (t)	$(t-1) - (t-1)^2/2 = (t-1)(3-t)/2$
arctan (t)	$t - t^3/3 = t(1 - t^2/3)$

The basic idea is to start with an approximation to the value of x in the equation to be solved, to use the high accuracy function to see how close you are to the given y-value, and to use the result to obtain a better approximation. This process is repeated as needed, each time adding a small amount to the previous approximation to get a better one.

Calculating the Logarithm: Scaling

Before we start the succesive approximations, we scale the problem to a workable range.

As an illustration, we calculate ln (12) to 3 places, using a 10-place calculator equipped with e^x. There is no question of using the series for ln (t), of course. What we can do, however, is note that ln (12) is one unit bigger than the ln of 12/e = 4.416, and similarly, two units bigger than the ln of $12/e^2 = 4.146/e = 1.624$, three units bigger than the ln of $12/e^3 = 1.146/e = .597$, and so on. The scaling we choose in this case consists of finding a number between $e^{-.5} = .607$ and $e^{.5} = 1.649$. That corresponds to the range -.5 to .5 for which the first 16 terms of the series for e^x in Part 1 gave high accuracy.

First Approximation

Thus, we see that ln (12) = 2 + ln (1.624), and now we must find ln (1.624). At this point we use the two-term formula and find .429 as an approximation to ln (1.624). To see how close this is, we calculate (with high precision) $e^{.429} = 1.536$. The closeness is measured by 1.624/1.536 = 1.057. Therefore, ln (1.624) = ln (1.536) + ln (1.624/1.536) = .429 + ln (1.057). Repeat with 1.057; its ln is approximately .056, and the exponential of this (with high precision) is 1.057. These calculations thus give with three-digit accuracy that ln (1.057) = .056. Totaling all terms we find the answer: ln (12) = 2 + .429 + .056 = 2.485

Albert Nijenhuis, Department of Mathematics, University of Pennsylvania, Philadelphia, PA 19104.

High Precision Functions, continued...

Program for Log

The program in Listing 1 is a close representation of the method. The input variable is X (not y), and the constants E2, and so on are set by the EXP program in Part 1. To avoid double precision divisions where possible, the program calculates, as an example, $1.624 \cdot e^{-.429}$ instead of $1.624/e^{.429}$; thus, X1 in line 1560 is the opposite sign of what was expected. The approximations are performed four times. This figure was obtained by experimentation on the least favorable input values, $e^{-.5}$ and $e^{.5}$.

Calculating The Arctan

Again, we illustrate the calculation of arctan with a hand calculator example: find arctan (2). Scaling leads to

$x = \pi/2$ - arctan (.5).

First Approximation

The two-term approximation yields .458 for arctan (.5). We denote this value a. Calculated with high precision, tan (.458) = .493. Let us denote this value by b, then tan (a) = b, and a is an approximation to arctan (.5).

Second Approximation

We now want a formula of the form arctan (.5) = a + arctan(something), so we can repeat the approximation process on the second term. (This in analogy to the formula for ln (1.624) above.) To find what "something" is, subtract a from both sides, take the tan and obtain tan(arctan .5 - a) = "something." On the left side we now use the trig formula:

tan(u-v) = (tan (u) - tan (v)/(1 + tan (u) tan (v))

in which we set u = arctan (.5) and v = a, which amounts to setting tan (u) = .5 and tan (v) = b = .493, and we obtain:

"something" = (.5 - .493)/(1 + (.5)·(.493)) = .005

That is, arctan (.5) = .458 + arctan (.005). The same procedure (left to you) applied to arctan (.005) gives the value .005 which is accurate to three places. Hence, arctan (2) = 1.571 - .458 - .005 = 1.107 (calculation in 10 digits, with three showing).

Programs for Arctan

The program in Listing 2 should not be hard to follow. The input is X, and lines 2800 to 2850 do the scaling. Lines 2900 to 2960 contain the approximation loop, with 2910 containing the two-term formula and 2950 the trig formula.

Calculating the Arcsin

The calculation of arcsin (y) follows a similar pattern. Let x be the desired angle, so sin (x) = y and x lies between $-\pi/2$ and $\pi/2$, whence cos (x) > 0. By virtue of the popular formula $\sin^2 + \cos^2 = 1$ it follows that cos x is the square root of $1 - y^2$. The square root must be calculated with high precision by a routine which we discuss below. Let z be the value of the square root. We then distinguish three cases for scaling: $y > z$, $y < -z$, and y between -z and z. In the first two cases, we calculate arctan(z/y) and use the same complementations as for ATN; in the last case we calculate arctan(y/z).

The program is given in Listing 3 and should require no further explanation.

Alternative Suggestions

The methods for LOG and ATN may be modified in several ways; for example, the two-term approximations may be replaced by some other approximation, such as a one-term approximation, or an approximation of degree 3 or higher. The choice of approximation method will determine the number of times the approximation must be performed for high accuracy. Sometimes an initial approximate value of surprisingly high accuracy can be obtained, such as the value of a single precision LOG or ATN function. We use this approach in the program in Listing 5, which is to be merged with the program in Listing 3 of Part 1. Then just one two-term approximation step will suffice.

Calculating Square Roots

A high precision version of SQR is obtained by the famous formula: if y is a given positive number, if x is the square root of y and if t is any positive number, then 1) if $t < x$ then $(t + y/t)/2$ is greater than x; 2) if $t > x$ then $(t + y/t)/2$ is also greater than x but is much closer to x. Hence, for given y, set t = 1, calculate $(t + y/t)/2$, reset t to this value, and repeat until satisfied.

The number of repetitions required depends on the value of y. If y is large, or close to zero, more repetitions are needed than if y lies, for example between .5 and 2, when five times is enough. We have, therefore, chosen to change y to a number between .5 and 2 by dividing (or multiplying) by factors 4; the square root thereby gains (loses) an equal number of factors 2. The program is given in Listing 4.

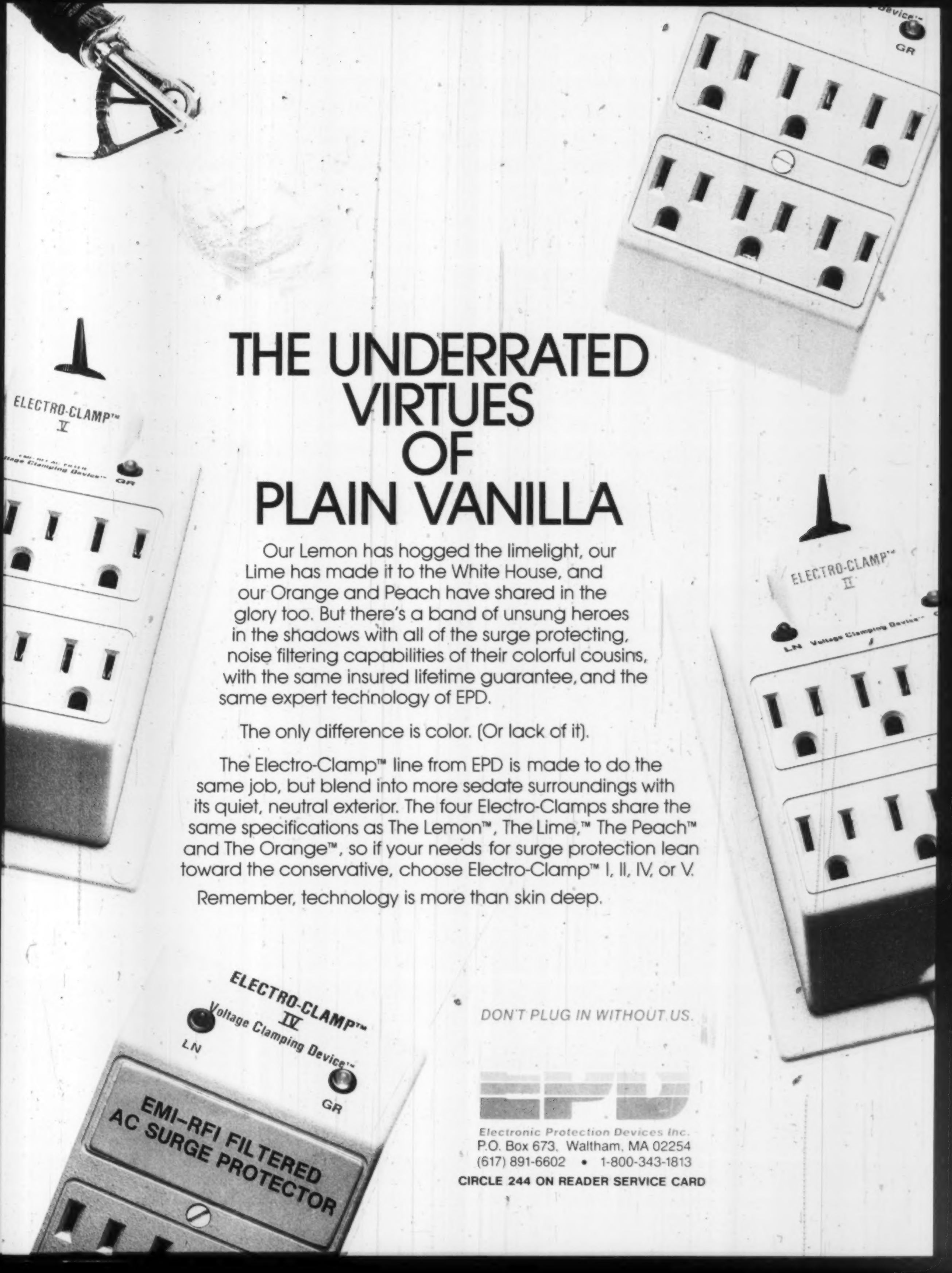
A better initial choice for t is the single precision value of SQR(Y) if that is available. Then no scaling is needed; this method is used in Listing 5. END

Listing 1.

```
1400 ' SUBROUTINE FOR LOG
1410 ' REQ: EXP (INITIALIZED)
1420 ' TO CALCULATE: GOSUB 1500
1430 ' INPUT VARIABLE: X
1440 ' OUTPUT VARIABLE: LN
1450 ' DBLE PREC: X, LN,
1460 ' X1, X2, C1, E2, E3, E4
1470 ' INTEGER: N
1480 '
1500 LN=0: X2=X: N=4
1510 IF X2<=E2 THEN 1530
1520 LN=LN+1: X2=X2*E4: GOTO 1510
1530 IF X2>=E3 THEN 1550
1540 LN=LN-1: X2=X2*E: GOTO 1530
1550 X1=(X2-1)*(X2-3)/2
1560 LN=LN-X1
1570 N=N-1: IF N=0 RETURN
1580 GOSUB 1300: X2=X2*C1
1590 GOTO 1550
1600 'END OF  LOG  ROUTINE
'
```

Listing 2.

```
2700 ' SUBROUTINE FOR ATN
2710 ' REQ: SIN COS (INITIALIZED)
2720 ' TO CALCULATE: GOSUB 2800
2730 ' INPUT VARIABLE: X
2740 ' OUTPUT VARIABLE: AT
2750 ' DBLE PREC: X, AT, X1, X3, X4
2770 '
2800 IF X<-1 THEN AT=-P2: GOTO 2820
2810 IF X>1 THEN AT=P2 ELSE 2840
2820 X3=1/X: GOSUB 2900
2830 AT=AT-X4: RETURN
2840 X3=X: GOSUB 2900
2850 AT=X4: RETURN
2860 '
2900 X4=0: N=3
2910 X1=X3*(1-X3*X3/3)
2920 X4=X4+X1
2930 N=N-1: IF N=0 RETURN
2940 GOSUB 2300: X1=S1/C1
2950 X3=(X3-X1)/(1+X1*X3)
2960 GOTO 2910
2970 'END OF  ATN  ROUTINE
'
```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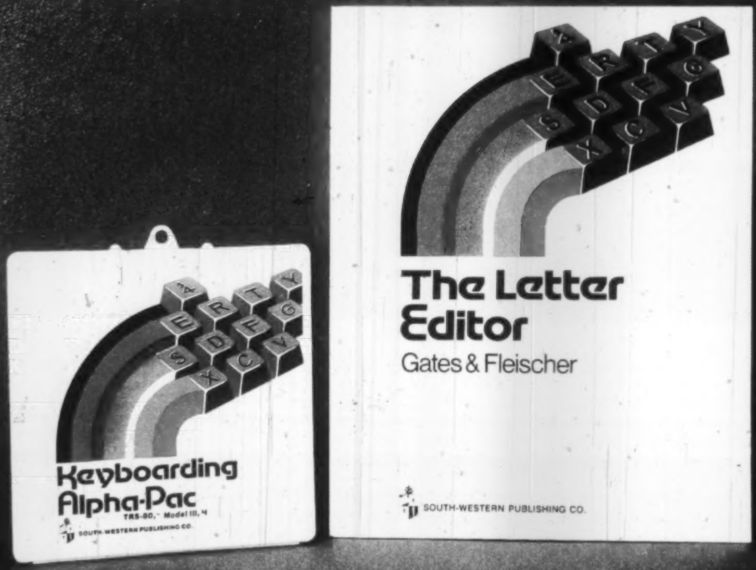

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High Precision Functions, continued...

Listing 3.

```
2400 ' SUBROUTINE FOR ASN
2410 ' REQ: SIN COS (INITIALIZED)
2420 '      SQR
2430 ' TO CALCULATE: GOSUB 2500
2440 ' INPUT VARIABLE: X (BETW -1 & 1)
2450 ' OUTPUT VARIABLE: AS
2460 ' DBLE PREC: X, AS, X1, X2,
2470 '           X3, X4, C1, S1
2480 '
2500 X2=1-X*X: GOSUB 3200
2510 IF X<-X1 THEN AS=-P2: GOTO 2530
2520 IF X>X1 THEN AS=P2 ELSE 2550
2530 X3=X1/X: GOSUB 2900
2540 AS=AS-X4: RETURN
2550 X3=X/X1: GOSUB 2900
2560 AS=X4: RETURN
2570 'END OF  ASN  ROUTINE
'
```

Listing 4.

```
3000 ' SUBROUTINE FOR SQR
3010 ' TO CALCULATE: GOSUB 3100
3020 ' INPUT VARIABLE: X (POS OR 0)
3030 ' OUTPUT VARIABLE: SR
3040 ' DBLE PREC: X, SR, X1, X2, X3
3050 ' INTEGER: N
3060 '
3100 X2=X: GOSUB 3200: SR=X1: RETURN
3110 '
3200 IF X2=0 THEN X1=0: RETURN
3210 X1=1: X3=X2
3220 IF X3<=2 THEN 3240
3230 X3=X3*.25: X1=X1*2: GOTO 3220
3240 IF X3>=.5 THEN 3260
3250 X3=X3*4: X1=X1*.5: GOTO 3240
3260 FOR N=1 TO 5
3270 X1=.5*(X1+X2/X1)
3280 NEXT N: RETURN
3290 'END OF  SQR  ROUTINE
'
```

Listing 5.

```
5060 PRINT TAB(12);"LOG";TAB(22);"5400";TAB(35);"LN#"
5080 PRINT TAB(12);"ASN";TAB(22);"5600";TAB(35);"AS#"
5090 PRINT TAB(12);"ATN";TAB(22);"5700";TAB(35);"AT#"
5100 PRINT TAB(12);"SQR";TAB(22);"5800";TAB(35);"SR#"
5400 LN#=LOG(X#): VN%=INT(-LN#+.5): V1#=-LN#-VN%:
     GOSUB 5310: V2#=X#*VA#:
     LN#=LN#-(V2#-1)*(V2#-3)/2: RETURN
5600 V2#=1-X#*X#: GOSUB 5850: IF X#<-V1# THEN
     AS#=-VP# ELSE IF X#>V1# THEN AS#=VP# ELSE 5620
5610 V3#=V1#/X#: GOSUB 5750: AS#=AS#-V4#: RETURN
5620 V3#=X#/V1#: GOSUB 5750: AS#=V4#: RETURN
5700 IF X#<-1 THEN AT#=-VP# ELSE IF X#>1 THEN AT#=VP#
     ELSE 5720
5710 V3#=1/X#: GOSUB 5750: AT#=AT#-V4#: RETURN
5720 V3#=X#: GOSUB 5750: AT#=V4#: RETURN
5750 V1#=ATN(V3#): V4#=V1#: GOSUB 5550: V1#=VB#/VA#:
     V3#=(V3#-V1#)/(1+V1#*V3#):
     V4#=V4#+V3#*(1-V3#*V3#/3): RETURN
5800 V2#=X#: GOSUB 5850: SR#=V1#: RETURN
5850 V1#=SQR(V2#): IF V1#=0 THEN RETURN ELSE
     V1#=.5DO*(V1#+V2#/V1#): RETURN
5860 ' END OF HIGH PREC FUNCT LOG, ASN, ATN, SQR
5860
5870 ' END OG HIGH PREC FUNCT  LOG, ASN, ATN, SQR
5870 ' END OF HIGH PREC. FUNCT.  LOG, ASN, ATN, SQR
     SUPPLEMENTING  EXP, SIN, COS  OF FIG. 4, PART 1
```

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CIRCLE 179 ON READER SERVICE CARD

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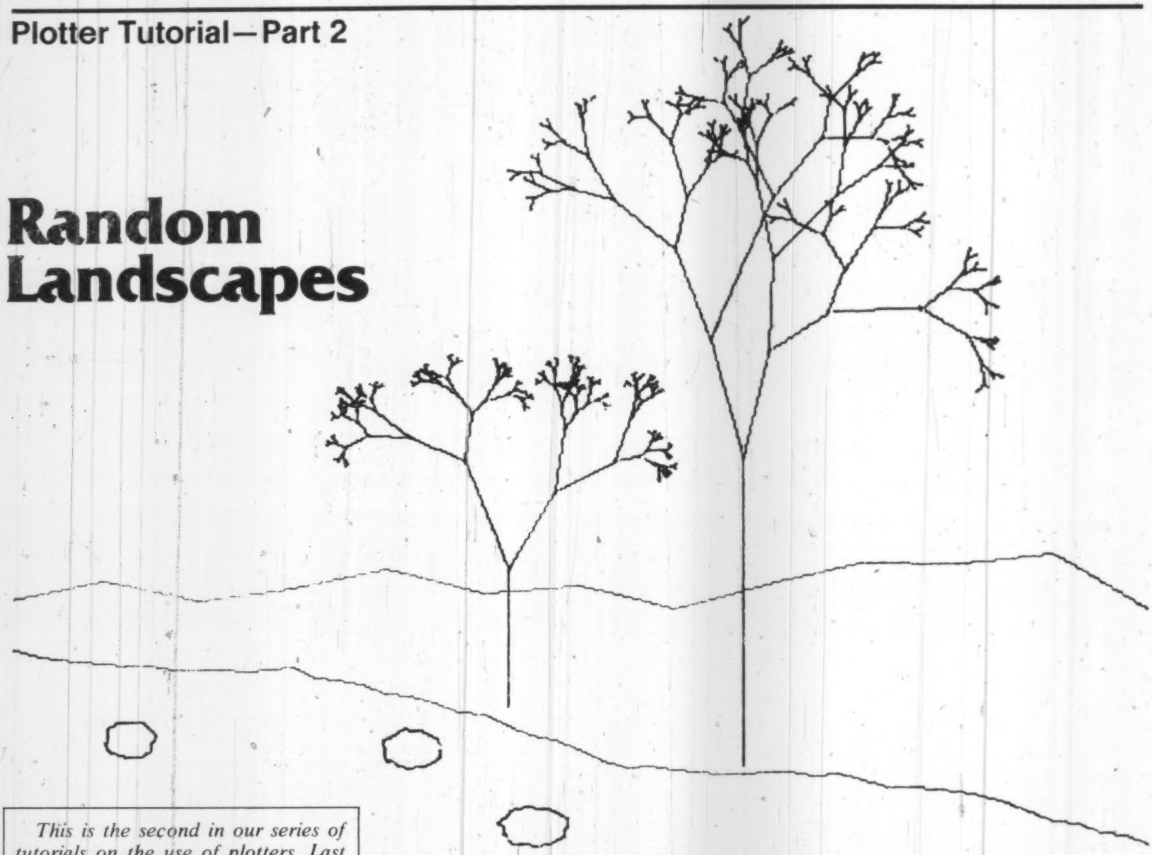
Plotter Tutorial—Part 2

Random Landscapes



This is the second in our series of tutorials on the use of plotters. Last month we had some mathematical constructions done on a Houston Instruments plotter. These plots were done on a Radio Shack CGP-115. Note the similarities and differences in plotter commands; it is much like two versions of Basic.

This tutorial shows the use of the controlled random function in plotting a scene. Long-time readers of Creative Computing *will recall that in January 1976 we ran the output of a similar plotting program which produced snowmen with various characteristics. Several are shown below.*

Next installment: three-dimensional curves and hidden line removal. —DHA

Today I have written the most useless program ever invented. Nevertheless, I am certain you will find it interesting. What is the program you ask? Well, think of it as your introduction to the field of computer art. This program draws the random landscapes that illustrate this article. Perhaps it will spark your interest in the latest field to be invaded by computers, that age old phenomenon called art.

Michiel van de Panne, Box 13, Site 16, SSI, Calgary, Alberta, Canada T2M 4N3.

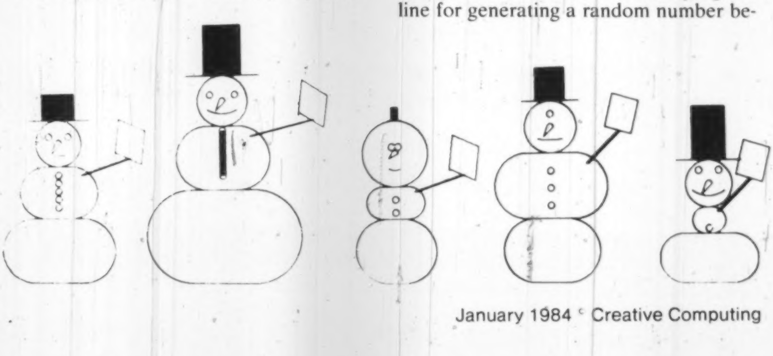
Michiel van de Panne

First of all, I should state that all the figures shown were drawn by the same program. All the variations are due to random numbers. Naturally, the ones I chose are the most appealing pictures that were generated. For every good landscape that is generated, there is frequently one that is not as attractive. This does nature justice, however, as the same holds true in nature.

To use the program, simply type it in and add the lines given for your computer. The remarks do not have to be typed in. The program will run as listed on the TRS-80 Model I/III with CGP-115 plotter. The figures were done with the CGP-115 plotter.

If there is no routine given for your computer, make one yourself. Line 20 should contain a clear screen, choose color, or whatever start up is necessary for your screen or plotter. Lines 920 and 930 should contain program lines to move to a point if A$="MOVE" and to draw to a point if A$="DRAW".

Depending on your screen size or plotting surface, you might have to scale down the drawing by multiplying the X and Y coordinates by a fraction. The origin should be located halfway across the screen and one quarter of the way up. For a screen of 200 by 140, this would mean adding 100 to X and 35 to Y when plotting. Lastly, line 940 should contain a program line for generating a random number be-



tween one and the number given by the variable R1.

Creating The Landscape

Each landscape is made up of five parts: the ground level, the mountain backdrop, the tree or trees, the rocks, and possibly a park bench with or without a back. The trick in creating a reasonable landscape lies in controlling the randomness of all these different parts without overdoing it. Too much control of the random factors results in a similar picture each time the program is run. A balance must be reached to allow for variety but to eliminate anything wholly unnatural.

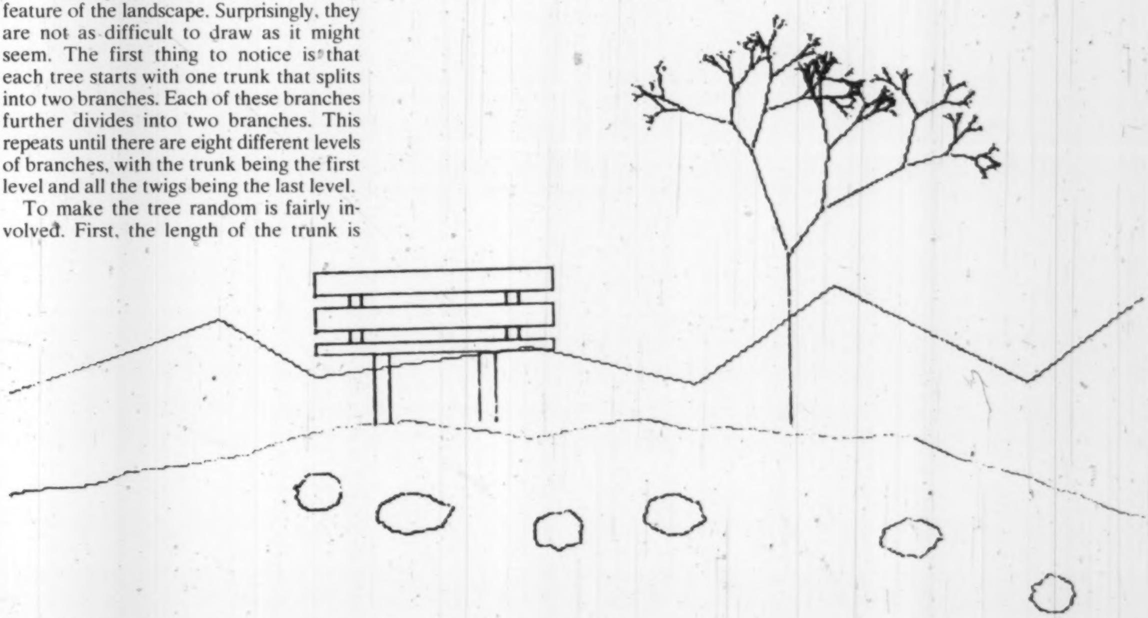
The ground level is the first part to be drawn in the scene. The first thought on drawing this simple slope at the bottom is simply to have a random height chosen along a regular interval of steps. Unfortunately, this results in a jagged and unrealistic surface. Instead, the program chooses a random constant that is added to the previous level at each step. This random constant is changed four times across the scene to allow for gradual changes. On top of this, more random numbers allow for minor variations of the levels dictated by first constant.

The mountains are much simpler to depict. The jagged surface that was unacceptable for the ground surface is perfectly acceptable for the mountains. The height of the mountains is changed to a different random number at random intervals. There is also a check included to ensure that they don't pass below the level of the ground that has been drawn.

The trees prove to be the most interesting feature of the landscape. Surprisingly, they are not as difficult to draw as it might seem. The first thing to notice is that each tree starts with one trunk that splits into two branches. Each of these branches further divides into two branches. This repeats until there are eight different levels of branches, with the trunk being the first level and all the twigs being the last level.

To make the tree random is fairly involved. First, the length of the trunk is

```
1 REM *** PROGRAM FOR DRAWING LANDSCAPES ***
2 REM *** REMARKS DO NOT HAVE TO BE TYPED IN ***
9 REM *** DIMENSION ARRAYS FOR USE IM DRAWING TREES ***
10 D=128:DIMA(D),A1(D),X(D),X1(D),Y(D),Y1(D),L(50),C(10)
20 LPRINTCHR$(18):LPRINT"M240,0":LPRINT"I"
29 REM *** GOSUB RANDOM GROUND & MOUNTAINS SUBROUTINE ***
30 GOSUB150
39 REM *** DECIDE HOW MANY TREES TO DRAW ***
40 R1=2:GOSUB940:F3=R1
49 REM *** GOSUB TREE DRAWING SUBROUTINE ***
50 FORZ=1 TO F3:GOSUB540  :NEXTZ
59 REM *** DECIDE HOW MANY ROCKS TO DRAW ***
60 R1=6:GOSUB940:F=R1:FORN=1TOF
68 REM *** DECIDE ON RANDOM POSITION FOR ROCKS AND ***
69 REM *** SEE IF OTHER ROCKS ARE NEARBY ***
70 C=0:R1=40:GOSUB940:X=R1+4:FORN1=1 TO N:IF ABS(X-C(N1))<4 THEN C=1
80 NEXTN1:IFC=1 THEN 70
85 C(N)=X
89 REM *** CHOOSE RAND. HEIGHT TO PUT ROCK & GOSUB SUBROUT. **
90 R1=30:GOSUB940:YC=L(X)-(20+R1):XC=X*10-240:GOSUB830  :NEXTN
99 REM *** DECIDE WHETHER OR NOT TO DRAW BENCH ***
100 R1=2:GOSUB910:IFR1=1THEN140
109 REM *** CHOOSE RAND. PLACE FOR BENCH & SEE IF GROUND LEVEL
110 T=T+1:R1=37:GOSUB940:X=R1:IFABS(L(X+3)-L(X+7))<6 THEN130
119 REM *** IF TRIED 40 TIMES, GOTO END ELSE TRY AGAIN ***
120 IF T=40 THEN 140  ELSE 110
129 REM *** GIVE COORDINATES FOR BENCH & GOSUB BENCH SUBROUTINE
130 X1=X*10-240:Y1=L(X+3):GOSUB310
140 END
149 REM *** RANDOM GROUND ***
150 R=12:R1=70:GOSUB940:Y=R1-35:XP=-240:YP=Y
160 A$="MOVE":GOSUB920:F=0
170 FORX=-240 TO 240 STEP 10
180 IFR<12 THEN R=R+1:GOTO200
190 R1=5:GOSUB940:RI=RI+R1-3:R=0
200 R1=5:GOSUB940:Y=Y+R1-3+RI:F=F+1:L(F)=Y
210 A$="DRAW":XP=X:YP=Y:GOSUB920
220 NEXTX:X=-240:GOTO240
229 REM *** RANDOM MOUNTAIN BACKGROUND ***
230 R1=6:GOSUB940:X=X+30+R1*10:IFX>240 THEN X=240
240 R1=50:GOSUB940:Y=20+R1
249 REM *** ENSURE MOUNTAINS DO NOT GO BELOW GROUND ***
250 IFY<L(X/10+24) THEN Y=L(X/10+24):F=1
260 IFX=-240 THEN GOSUB520:GOTO270
265 GOSUB 530
270 IFX=240 THEN 300
280 IF F=1 THEN 300
290 GOTO 230
300 RETURN
309 REM *** DRAW BENCH ***
310 X=X1+25:Y-Y1:GOSUB520
```



specified by a random number. From the trunk onward, the length of each branch is about six tenths of the length of the previous level plus or minus a small random factor. The angles of the branches are also determined randomly. For each branch on a previous level, one branch goes to the left at a random angle (with respect to the branch to which it is attached), and another goes to the right.

I have not fully explored the possibilities of the random tree. Leaves would be one possible addition. Another interesting possibility would be to depict the tree as if being bent by the wind. I have tried this, but have not yet been successful at it. At any rate, there is an infinite number of things that can be randomly controlled or randomly added.

Another interesting possibility would be to depict the tree as if being bent by the wind.

From the tree, the program proceeds to draw a random number of randomly shaped rocks. These rocks are basically circles that have been randomly deformed. As the angle of the circle increases in random steps, the radius is controlled by random numbers. In addition to this, the X axis of the circle is stretched randomly by a factor of between one and two. If this isn't random enough for you, the program also decides randomly how many rocks to draw and where to place them.

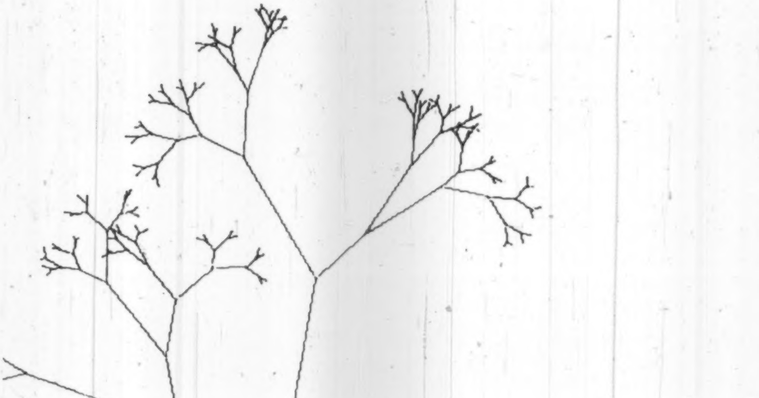
The last thing put in to complete the landscape is the park bench. First, there is a 50% chance that there will be a bench drawn. Second, if there is to be a bench, the computer will search for a flat spot to place the bench. If there is no such flat spot, the bench will not be drawn. Once a flat spot has been found, a bench without a back will be drawn. Another 50/50 chance determines whether a back is added to the bench.

Identical Pictures?

For those interested in the chances of getting two identical pictures, the possibility of this happening is very small. The average drawing uses about 850 different random numbers. The average random number called for is between 1 and 20. This makes the chances of getting two identical pictures roughly 1 in 20 to the power of 850.

With all these random numbers, a somewhat random landscape has been made. Unfortunately, it is still no match for the variety and diversity of the landscapes found in nature. This program was not intended to duplicate nature though. To do so is an impossible task. If anything, these drawings will impress you because they are drawn by your 100% logical, digital, electronic computer. Furthermore, they show the beginning of the expanding possibilities of computer art. The last thought that the pictures impart is an immense appreciation for the beauty in the orderly chaos of nature. END

```
320 Y=Y1+30:GOSUB530   :X=X1+32:GOSUB530
330 Y=Y1:GOSUB530   :X=X1+75:Y=Y1:GOSUB520
340 Y=Y1+30:GOSUB530   :X=X1+68:GOSUB530
350 Y=Y1:GOSUB530   :X=X1:Y=Y1+30:GOSUB520
360 X=X1+100:GOSUB530   :Y=Y1+35:GOSUB530
370 X=X1:GOSUB530   :Y=Y1+30:GOSUB530
379 REM *** DECIDE WHETHER OR NOT TO DRAW BACK ON BENCH ***
380 R1=2:GOSUB940:IFR1=1 THEN RETURN
389 REM *** DRAW BACK OF BENCH ***
390 Y=Y1+40:GOSUB520   :Y=Y1+50:GOSUB530   :X=X1+100:GOSUB530
400 Y=Y1+40:GOSUB530   :X=X1:GOSUB530   :Y=Y1+55:GOSUB520
410 Y=Y1+65:GOSUB530   :X=X1+100:GOSUB530
420 Y=Y1+55:GOSUB530   :X=X1:GOSUB530
430 X=X1+15:Y=Y1+35:GOSUB520   :Y=Y1+40:GOSUB530
440 Y=Y1+50:GOSUB520   :Y=Y1+55:GOSUB530
450 Y=Y1+35:X=X1+20:GOSUB520   :Y=Y1+40:GOSUB530
460 Y=Y1+50:GOSUB520   :Y=Y1+55:GOSUB530
470 Y=Y1+35:X=X1+80:GOSUB520   :Y=Y1+40:GOSUB530
480 Y=Y1+50:GOSUB520   :Y=Y1+55:GOSUB530
490 Y=Y1+35:X=X1+85:GOSUB520   :Y=Y1+40:GOSUB530
500 Y=Y1+50:GOSUB520   :Y=Y1+55:GOSUB530
510 RETURN
```



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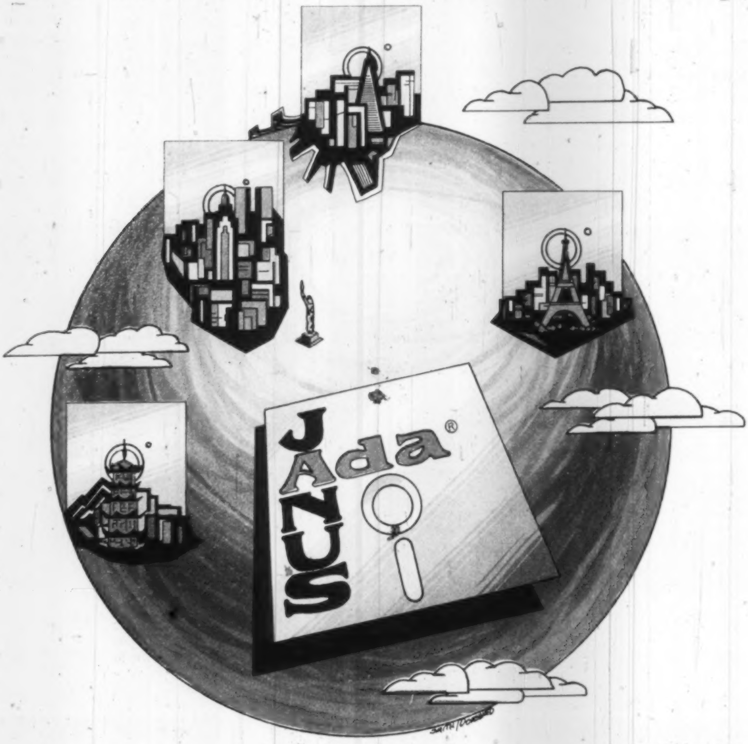

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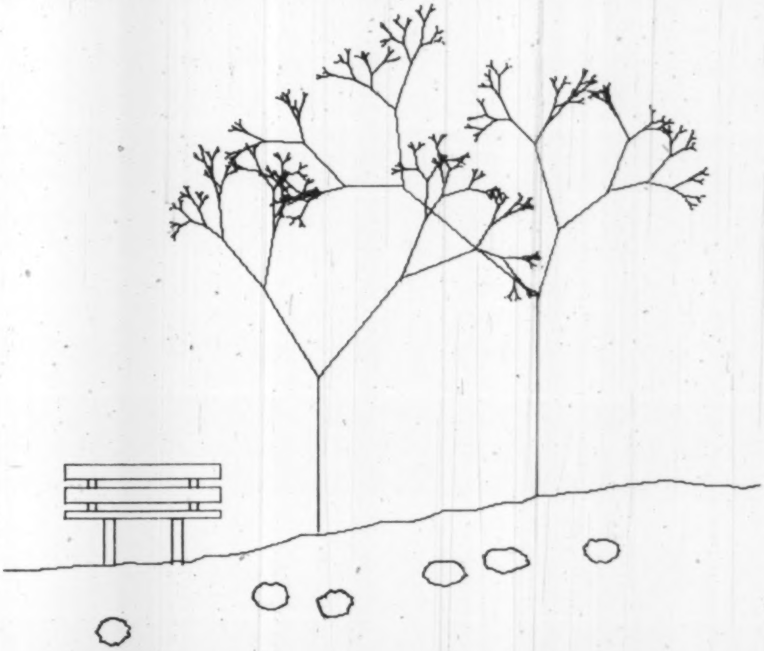
CIRCLE 237 ON READER SERVICE CARD

Plotter Tutorial, continued...

```
520 XP=X:YP=Y:A$="MOVE":GOSUB920   :RETURN
530 XP=X:YP=Y:A$="DRAW":GOSUB920   :RETURN
539 REM *** DRAW TREE(S) ***
540 NL=8:B=2[(NL-1)
550 PI=3.1415926:P=PI/2
559 REM *** GIVE RANDOM LENGTH FOR TRUNK ***
560 R1=150:GOSUB940:A(1)=P:LE=50+R1:F=1
569 REM *** CHOOSE RAND. PLACE FOR TREE & CHECK FOR OTHER TREES
570 R1=20:GOSUB940:C=0:X=R1+14:FORN=1 TO Z-1:IF ABS(X-C(N))<10 THEN C=1
580 NEXTN
589 REM *** GO BACK IF OTHER TREES TOO CLOSE ***
590 IFC=1 THEN 570
600 C(Z)=X:Y1=L(X):X1=X*10-240
609 REM *** MOVE TO START OF TRUNK ***
610 A$="MOVE":XP=X1:YP=Y1:GOSUB920
619 REM *** LOOP THRU LEVELS OF BRANCHES ***
620 FORL=1 TO NL:IFL>1 THEN 640
630 X=0:Y=LE:A$="DRAW":XP=X+X1:YP=Y+Y1:GOSUB920   :X(1)=X:Y(1)=Y:GOTO780
640 C=F
649 REM *** LOOP THRU ALREADY DRAWN BRANCHES TO ADD MORE ***
650 F=0:FORN=1 TO C
659 REM *** GET RAND. ANGLE & LENGTH FOR BRANCH ***
660 GOSUB800
669 REM *** CALCULATE X,Y WHERE BRANCH WILL END ***
670 F=F+1:A=A(N)-AN:X=COS(A)*LN+X(N):Y=SIN(A)*LN+Y(N)
679 REM *** MOVE TO START OF BRANCH ***
680 A$="MOVE":XP=X(N)+X1:YP=Y(N)+Y1:GOSUB920
689 REM *** DRAW TO END OF BRANCH ***
690 A$="DRAW":XP=X+X1:YP=Y+Y1:GOSUB920
699 REM *** RECORD ENDPOINTS FOR START PTS. OF NEXT LEVEL ***
700 A1(F)=A:X1(F)=X:Y1(F)=Y
709 REM *** REPEAT FOR 2ND BRANCH, ONLY BRANCH GOES TO RIGHT
710 GOSUB 800
720 F=F+1:A=A(N)+AN:X=COS(A)*LN+X(N):Y=SIN(A)*LN+Y(N)
730 A$="MOVE":XP=X(N)+X1:YP=Y(N)+Y1:GOSUB920
740 A$="DRAW":XP=X+X1:YP=Y+Y1:GOSUB920
750 A1(F)=A:X1(F)=X:Y1(F)=Y
760 NEXTN
769 REM *** NEW ENDPOINTS & ANGLE BECOME OLD ONES ***
770 FORN=1TOF:A(N)=A1(N):X(N)=X1(N):Y(N)=Y1(N):NEXTN
779 REM *** MAKE LENGTH OF NEXT SET OF BRANCHES SHORTER ***
780 LE=LE*.6:NEXTL
790 RETURN
799 REM *** CHOOSE RANDOM ANGLE FOR BRANCH (IN RADIANS) ***
800 R1=45:GOSUB940:AN=(R1+5)*PI/180
809 REM *** CHOOSE RANDOM LENGTH FOR BRANCH ***
810 R1=LE:GOSUB940:LN=R1+LE/2
820 RETURN
829 REM *** DRAW RANDOM ROCK(S) ***
```



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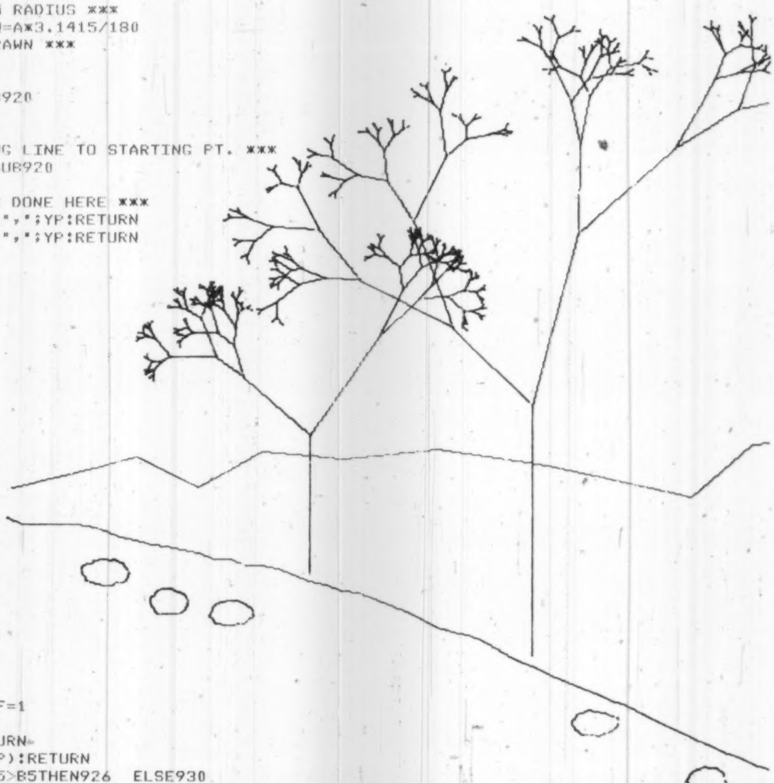
```
830 RA=40:R1=0:GOSUB940:XM=1+R1:M=.2:A=0
831 REM *** XM IS A FACTOR WHICH ELONGATES ROCK ***
840 X1=RA*XM*M:Y1=0:A$="MOVE":XP=X1+XC:YP=Y1+YC:GOSUB920
849 REM *** INCREASE ANGLE & CHECK FOR COMPLETE CIRCLE ***
850 R1=20:GOSUB940:A=A+5+R1:IFA>360 THEN 900
859 REM *** CHOOSE PARTIALLY RANDOM RADIUS ***
860 R1=RA*.2:GOSUB940:R=RA*.9+R1:AN=A*3.1415/180
869 REM *** CALCULATES X,Y TO BE DRAWN ***
870 X=M*XM*COS(AN)*R:Y=SIN(AN)*R*M
879 REM *** DRAW LINE TO X,Y ***
880 A$="DRAW":XP=X+XC:YP=Y+YC:GOSUB920
889 REM *** CONTINUE ***
890 GOTO850
899 REM *** COMPLETE ROCK BY DRAWING LINE TO STARTING PT. ***
900 A$="DRAW":XP=X1+XC:YP=Y1+YC:GOSUB920
910 RETURN
919 REM *** ACTUAL MOVING & DRAWING DONE HERE ***
920 IF A$="MOVE" THEN LPRINT"M";XP;",";YP:RETURN
930 IF A$="DRAW" THEN LPRINT"D";XP;",";YP:RETURN
940 R1=RND(R1):RETURN
```



Lines to be added for Model I/III screen:

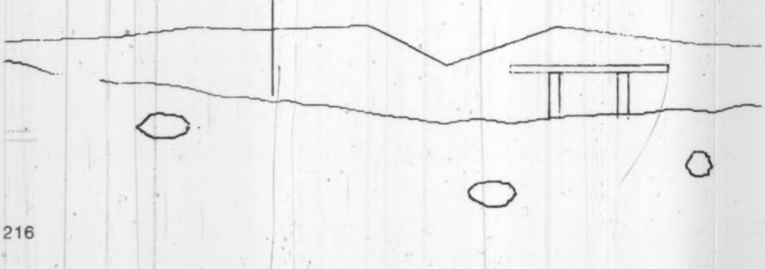
```
20 CLS:ON ERROR GOTO 21:GOTO30
21 RESUME NEXT
140 PRINT@0,"DONE";:GOTO140
560 R1=80:GOSUB940:A(1)=P:LE=50+R1:F=1
920 XP=XP*.25+64:YP=47-(YP*.11+10)
921 IFA$="MOVE"THEN XO=XP:YO=YP:RETURN
924 IFXO=XP AND YO=YP THEN SET(XP,YP):RETURN
925 A5=ABS(XP-XO):B5=ABS(YP-YO):IFA5>B5THEN926  ELSE930
926 IFXP>XOTHENC5=XO:D5=XP:E5=YO:F5=YP:GOTO928
927 C5=XP:D5=XO:E5=YP:F5=YO
928 G5=D5-C5:H5=(F5-E5)/G5:FORU5=C5TOD5
929 SET(U5,E5):E5=E5+H5:NEXT:GOTO934
930 IFYP>YOTHENC5=YO:D5=YP:E5=XO:F5=XP:GOTO932
931 C5=YP:D5=YO:E5=XP:F5=XO
932 G5=D5-C5:H5=(F5-E5)/G5
933 FORU5=C5TOD5:SET(E5,U5):E5=E5+H5:NEXT
934 XO=XP:YO=YP:RETURN
940 R1=RND(R1):RETURN
```

Lines to be added for Color Computer with CGP-115 plotter:

```
20 PRINT#-2,CHR$(18):PRINT#-2,"M240,0":PRINT#-2,"I"
920 IFA$="MOVE" THEN PRINT#-2,"M";XP;",";YP:RETURN
930 IFA$="DRAW" THEN PRINT#-2,"D";XP;",";YP:RETURN
```

Lines to be added for Apple II screen:

```
20 HGR2:HCOLOR=7
560 R1=80:GOSUB940:A(1)=P:LE=50+R1:F=1
920 XP=XP*.4+140:YP=179-(YP*.4+41)
925 IFA$="MOVE"THEN XO=XP:YO=YP:RETURN
930 HPLOT XO,YO TO XP,YP:XO=XP:YO=YP:RETURN
940 Y=INT(RND(1)*R1)+1:RETURN
```



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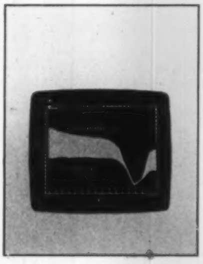

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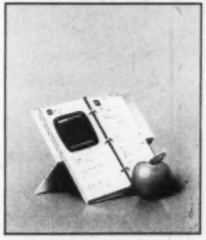

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CIRCLE 120 ON READER SERVICE CARD

A $3.50 Apple Key Pad

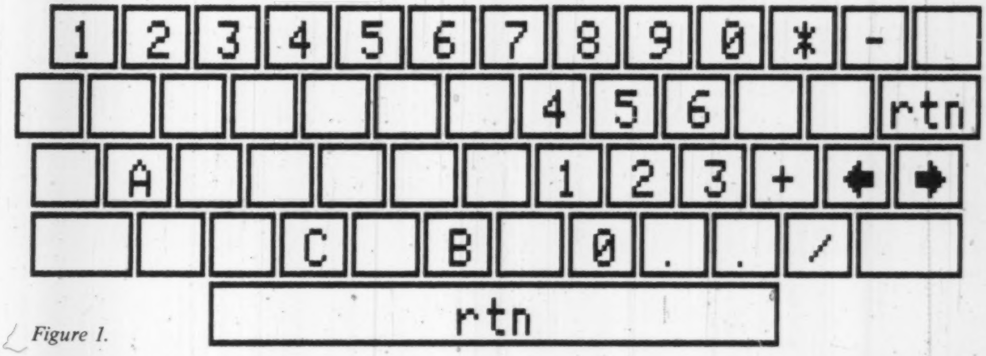

Figure 1.

Wally Hubbard

I haven't yet met an Apple owner who could be considered poor. Nor have I met one who had all the gadgets he wanted. The Apple is a "gadget-friendly" computer: there are eight slots for cards of all kinds, game paddle connections, keyboard modifications, fans, power supplies, and upper/lower-case adapter ROMs.

My Apple came barebones; I bought some RAM chips from the back pages of a magazine to fill it up cheaply and then a disk drive. Then came a music card, an interface, then another, and now seven of the eight slots are filled with no good way to reach the eighth because of all the wires. If riches were counted by the number of green circuit boards a person has, I would be in good shape.

One thing I couldn't see spending money on, however, was a numeric keypad. I don't enter that many numbers. And besides, there is always another gadget that claims my dollars first.

Made of RAM

You get what you pay for: this keypad has no extra keys to sit beside your Apple and no snazzy ribbon cable to thread into the back of your computer. It is just an assembly language program that must be typed in. But it costs only about $3.00—whatever you paid for this magazine (if you subscribe, you got a discount).

The keypad uses the existing Apple keyboard, and translates the U, I, and O keys to 4, 5, 6 and the J, K, L keys to 1, 2, 3. Those are the keys right below 7, 8, and 9 on the keyboard, so the layout is like a numeric keypad. M is zero, and the comma and period both translate to decimal points. The number keys remain the same. The spacebar acts as a return key along with the regular return key. All other keys are translated to spaces, except for the parentheses, asterisk, slash, minus, and plus. The keypad is shown in Figure 1.

The Apple is a "gadget-friendly" computer.

As a bonus, the keypad allows you to add, multiply, subtract, and divide. And it lets you include variables A, B, and C in your data entry. In addition, you can use parentheses to nest operations.

If you type:

```
2*(2+2-3)/8
```

your Apple does the figuring and it is just as if you had typed:

```
.25
```

If you type:

```
A*2
```

the input is twice the value of the variable A.

If you enter a blank line, you get a syntax error, which must be taken care of with an ONERR GOTO. If you want, the error handling can be used to set up special features. For instance, a blank line could mean the variable is to be set equal to a default value.

To use the keypad, use this command in your program:

```
CALL 768 A
```

and the input will be assigned to the variable A. The general syntax is CALL 768 (var) where (var) is any real variable.

Applesoft Helped

Actually, most of the programming needed to implement this keypad is already available in Applesoft, in the permanent memory. So we are hitching a ride. If you want to know how the keypad works, look at the assembly listing (Listing 1). If you want it to work immediately, type in data shown in the memory dump and save it to disk (Listing 2). Then check your work by trying to use it with the Basic demonstration program (Listing 3).

I do not recommend using the keypad subroutine without writing a Basic program. It probably won't work, because the CALL 768 (var) interactive command is stored in the same buffer as the keypad input, and you will erase it while it is still being read. this problem doesn't occur when you use CALL 768 (var) from within a program.

Reference

The Applesoft subroutines are listed and explained in the article "Applesoft Internal Entry Points," by John Crossley, in Volume 1 Number 1 of *Apple Orchard*. Published by the International Apple Core, 908 George St., Santa Clara, CA 95050. Cost: $2.50.

Wally Hubbard, 3174-321 Pheasant Run Dr., Lafayette, IN 47905.

Listing 1.

```
SOURCE FILE: KEY PAD
0000:               1 ; ---------------------------------------
0000:               2 ;
0000:               3 ; KEYPAD SUBROUTINE
0000:               4 ;
0000:               5 ; ---------------------------------------
0000:               6 ;
0000:               7 ; WALLY HUBBARD
0000:               8 ; LAFAYETTE, IN, USA  47905
0000:               9 ;
0000:              10 ; JULY 15TH, 1983
0000:              11 ;
0000:              12 ; ASSEMBLED WITH DOS TOOL KIT
0000:              13 ;
0000:              14 ; ---------------------------------------
0000:              15 ;
0000:              16 ; WHEN THIS ROUTINE IS CALLED
0000:              17 ; IT RUNS KEYBOARD INPUT THROUGH
0000:              18 ; A CHARACTER TRANSLATION TABLE
0000:              19 ; UNTIL A CARRIAGE RETURN
0000:              20 ; IS ENCOUNTERED.  THE INPUT IS
0000:              21 ; ASSIGNED TO A REAL VARIABLE.
0000:              22 ;
0000:              23 ; CALL THIS ROUTINE FROM BASIC WITH
0000:              24 ; THE COMMAND "CALL 768 <VAR>", WHERE
0000:              25 ; "<VAR>" IS THE REAL VARIABLE TO
0000:              26 ; WHICH THE INPUT IS TO BE ASSIGNED.
0000:              27 ;
0000:              28 ; ---------------------------------------
0000:              29 ;
0000:              30 ;
0000:              31 ;
0088:              32 BACKSPACE EQU $88       ;CONTROL-H
0095:              33 CTRLU   EQU  $95        ;CONTROL-U
FD1B:              34 KEYIN   EQU  $FD1B      ;STANDARD KEYBOARD INPUT ROUTINE
0038:              35 KSWL    EQU  $38        ;LOW BYTE OF KSW
0039:              36 KSWH    EQU  $39        ;HIGH BYTE OF KSW
0000:              37 ; KSW POINTS TO THE CURRENT CHARACTER INPUT ROUTINE
D52C:              38 INLIN   EQU  $D52C      ;LINE INPUT ROUTINE
DD7B:              39 FRMEVL  EQU  $DD7B      ;EVALUATES THE FORMULA AT TXTPTR
EB2B:              40 MOVMF   EQU  $EB2B      ;MOVE A REAL TO VARIABLE STORAGE
00B8:              41 TXTPTR  EQU  $B8        ;TEXT POINTER
0000:              42 ; POINTS TO THE TEXT TO BE READ NEXT
DFE3:              43 PTRGET  EQU  $DFE3      ;LOCATE THE ADDRESS OF A VARIABLE
008D:              44 RETURN  EQU  $8D        ;CONTROL-M
00A0:              45 SP      EQU  $A0        ;SPACE CHARACTER
0000:              46 ;
0000:              47 ;
0000:              48 ;
----- NEXT OBJECT FILE NAME IS KP
0300:              49         ORG  $300       ; (ARBITRARY)
0300:              50 ;
0300:              51 ;
0300:              52 ;
0300:              53 ; INSERT THE CHARACTER TRANSLATION ROUTINE
0300:              54 ; BETWEEN DOS AND THE KEYBOARD
0300:              55 ;
0300:A9 03         56         LDA  #<SWITCH  ; POINT KSW AT SWITCH
0302:85 39         57         STA  KSWH
0304:A9 63         58         LDA  #>SWITCH
0306:85 38         59         STA  KSWL
0308:20 EA 03      60         JSR  $3EA      ; RECONNECT DOS
030B:              61 ;
030B:              62 ; NOW THAT THE CHARACTER TRANSLATION ROUTINE IS IN PLACE,
030B:              63 ; WE CAN TAKE A LINE OF (TRANSLATED) INPUT:
```

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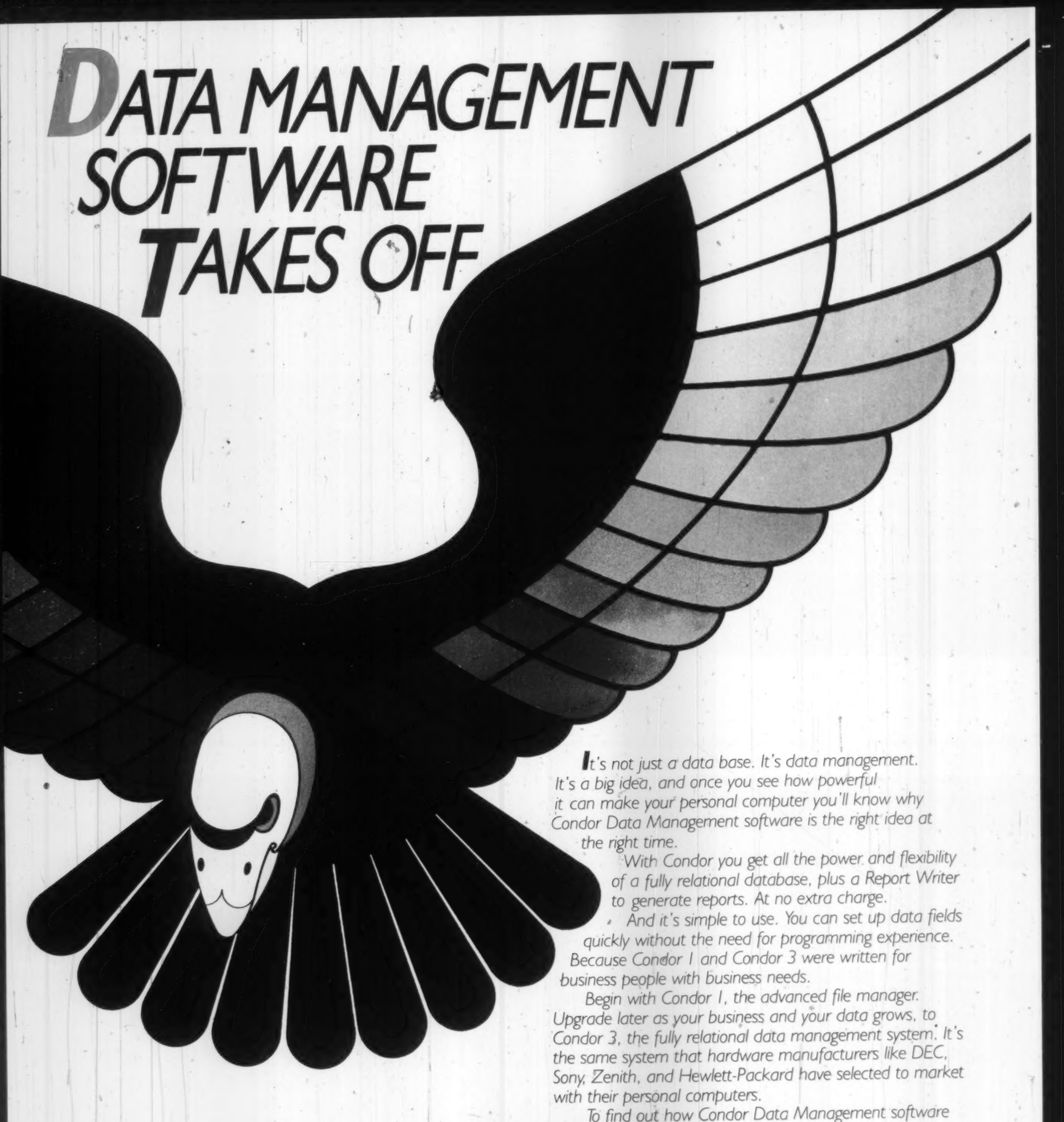

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CIRCLE 246 ON READER SERVICE CARD

Apple Keypad, continued...

```
030B:             ;
030B:20 2C D5                 JSR  INLIN
030E:             ;
030E:             ; FURTHER TRANSLATION IS NECESSARY FOR THE SPECIAL CHARACTERS
,
030E:             ; SINCE THE FORMULA EVALUATION ROUTINE REQUIRES TOKENS
030E:             ; FOR +-* AND /.
030E:             ;
030E:                         MSB  OFF          ; 'A' = 65 = $41
030E:A2 00          T0        LDX  #$00
0310:BD 00 02       T1        LDA  $200,X       ; LOOP UNTIL (ACCUMULATOR) = 0
0313:F0 24                    BEQ  T3
0315:C9 2D                    CMP  #'-'         ; CHANGE '-' TO $C9
0317:D0 04                    BNE  TA1
0319:A9 C9                    LDA  #$C9
031B:D0 16                    BNE  T2
031D:C9 2A          TA1       CMP  #'*'         ; CHANGE '*' TO $CA
031F:D0 04                    BNE  TA2
0321:A9 CA                    LDA  #$CA
0323:D0 0E                    BNE  T2
0325:C9 2F          TA2       CMP  #'/'         ; CHANGE '/' TO $CB
0327:D0 04                    BNE  TA3
0329:A9 CB                    LDA  #$CB
032B:D0 06                    BNE  T2
032D:C9 2B          TA3       CMP  #'+'         ; CHANGE '+' TO $C8
032F:D0 02                    BNE  T2
0331:A9 C8                    LDA  #$C8
0333:9D 00 02       T2        STA  $200,X       ; STORE THE RESULT...
0336:E8                       INX                ; ...AND GET THE NEXT CHARACTER...
0337:D0 D7                    BNE  T1           ; ...UNTIL THE LINE HAS BEEN READ
0339:             ;
0339:             ;
```

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```
0339:          ;
0339:          ; EVALUATE THE INPUT LINE AS A FORMULA
0339:          ;
0339:                  MSB  ON         ; 'A' = 193 = $C1
0339:A5 B8     T3      LDA  TXTPTR     ; SAVE TXTPTR
033B:48                PHA
033C:A5 B9             LDA  TXTPTR+1
033E:48                PHA
033F:A9 00             LDA  #$00       ; POINT TXTPTR AT THE INPUT BUFFER
0341:85 B8             STA  TXTPTR
0343:A9 02             LDA  #$02
0345:85 B9             STA  TXTPTR+1
0347:20 7B DD          JSR  FRMEVL     ; EVALUATE THE FORMULA IN THE BUFFER
034A:68                PLA             ; RESTORE OLD TXTPTR VALUE
034B:85 B9             STA  TXTPTR+1
034D:68                PLA
034E:85 B8             STA  TXTPTR
0350:20 E3 DF          JSR  PTRGET     ; GET VARIABLE STORAGE ADDRESS
0353:AA                TAX             ; SET UP FOR MOVMF
0354:20 2B EB          JSR  MOVMF      ; MOVE FP ACC CONTENTS TO STORAGE
0357:          ;
0357:          ;
0357:          ;
0357:          ; DISCONNECT THE TRANSLATION ROUTINE
0357:          ;
0357:A9 FD     RET     LDA  #<KEYIN    ; PR#0 EQUIVALENT
0359:85 39             STA  KSWH
035B:A9 1B             LDA  #>KEYIN
035D:85 38             STA  KSWL
035F:20 EA 03          JSR  $3EA
0362:60                RTS
0363:          ;
0363:          ;
0363:          ;
0363:          ; SWITCH THE ORIGINAL CHARACTER
0363:          ; FOR A CHARACTER IN THE TABLE
0363:          ;
0363:20 1B FD  SWITCH  JSR  KEYIN      ; GET CHAR FROM KEYBOARD
0366:C9 8D             CMP  #RETURN    ; $0D IS PASSED THROUGH
0368:F0 06             BEQ  SR
036A:C9 A0     S1      CMP  #SP        ; SPACE IS CHANGED TO RETURN
036C:D0 03             BNE  S2
036E:A9 8D             LDA  #RETURN
0370:60        SR      RTS
0371:C9 88     S2      CMP  #BACKSPACE ; BACKSPACE IS PASSED THROUGH
0373:F0 FB             BEQ  SR
0375:C9 95     S3      CMP  #CTRLU     ; CONTROL-U IS PASSED THROUGH
0377:F0 F7             BEQ  SR
0379:C9 A8     S4      CMP  #'('       ; ANYTHING LESS THAN '('...
037B:90 15             BCC  NULL
037D:C9 D6             CMP  #'V'       ; ...OR GREATER THAN 'V' ...
037F:B0 11             BCS  NULL       ; ...IS CHANGED TO A SPACE
0381:38                SEC
0382:E9 A8             SBC  #'('       ; CALCULATE TABLE INDEX
0384:29 7F             AND  #$7F
0386:8E 91 03          STX  XTEMP
0389:AA                TAX
038A:BD 95 03          LDA  TABLE,X    ; TRANSLATE
038D:AE 91 03          LDX  XTEMP
0390:60                RTS             ; FINISHED
0391:          ;
0391:          ;
0391:          ;
0391:00        XTEMP   DFB  0          ; STORAGE FOR X REGISTER
0392:          ;
0392:          ;
0392:          ;
```

```
0392:A9 A0      162 NULL     LDA   #SP          ;RETURN A SPACE
0394:60         163          RTS
0395:           164 ;
0395:           165 ;
0395:           166 ;
0395:           167 ; TRANSLATION TABLE
0395:           168 ;                NEW        ;OLD
0395:           169 ;
0395:A8 A9      170 TABLE    ASC   '()'         ;()
0397:AA AB      171          ASC   '*+'         ;*+
0399:AE AD      172          ASC   '.-'         ;,-
039B:AE AF      173          ASC   './'         ;./
039D:B0 B1 B2   174          ASC   '0123456789'
03A0:B3 B4 B5
03A3:B6 B7 B8
03A6:B9
03A7:AA AB      175          ASC   '*+'         ;;:
03A9:AE AD AE   176          ASC   '.-.'        ;<=>
03AC:AF         177          DFB   '/'          ;?
03AD:A0         178          DFB   SP           ;@
03AE:C1 C2 C3   179          ASC   'ABC'        ;ABC
03B1:A0 A0 A0   180          DFB   SP,SP,SP     ;DEF
03B4:A0 A0 B5   181          DFB   SP,SP,'5'    ;GHI
03B7:B1 B2 B3   182          ASC   '123'        ;JKL
03BA:B0 A0 B6   183          DFB   '0',SP,'6'   ;MNO
03BD:A0 A0 A0   184          DFB   SP,SP,SP     ;PQR
03C0:A0 A0 B4   185          DFB   SP,SP,'4'    ;STU

*** SUCCESSFUL ASSEMBLY: NO ERRORS
```

Listing 2. Key Pad memory dump. Enter the Monitor (CALL -151) and type the following:

```
300: A9 03 85 39 A9 63 85 38
308: 20 EA 03 20 2C D5 A2 00
310: BD 00 02 F0 24 C9 2D D0
318: 04 A9 C9 D0 16 C9 2A D0
320: 04 A9 CA D0 0E C9 2F D0
328: 04 A9 CB D0 06 C9 2B D0
330: 02 A9 C8 9D 00 02 E8 D0
338: D7 A5 B8 48 A5 B9 48 A9
340: 00 85 B8 A9 02 85 B9 20
348: 7B DD 68 85 B9 68 85 B8
350: 20 E3 DF AA 20 2B EB A9
358: FD 85 39 A9 1B 85 38 20
360: EA 03 60 20 1B FD C9 8D
368: F0 06 C9 A0 D0 03 A9 8D
370: 60 C9 88 F0 FB C9 95 F0
378: F7 C9 A8 90 15 C9 D6 B0
380: 11 38 E9 A8 29 7F 8E 91
388: 03 AA BD 95 03 AE 91 03
390: 60 00 A9 A0 60 A8 A9 AA
398: AB AE AD AE AF B0 B1 B2
3A0: B3 B4 B5 B6 B7 B8 B9 AA
3A8: AB AE AD AE AF A0 C1 C2
3B0: C3 A0 A0 A0 A0 A0 B5 B1
3B8: B2 B3 B0 A0 B6 A0 A0 A0
3C0: A0 A0 B4
BSAVE KP,A$300,L$C3
```

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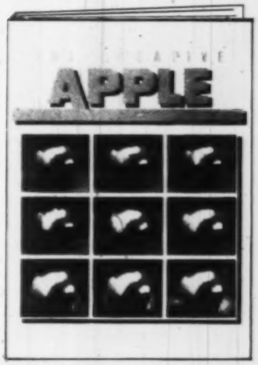

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Apple Keypad, continued...

Listing 3. Key Pad Demonstration Program. Pressing just the return key at the prompt enters a default value of 123456.789.

```
 10  REM   KEY PAD DEMO
 20  PRINT  CHR$ (4);"BLOAD KP"
 30  GOSUB 150
 40 DE = 123456.789
 50  PRINT "ENTER 0 TO QUIT."
 60  PRINT "ENTER A NUMBER USING THE KEY PAD: ";
 70  CALL 768A
 80  PRINT A: PRINT
 90  IF A <  > 0 GOTO 60
100  POKE 216,0: END : REM  TURN OFF ONERR
110  CALL 965: REM  ERR HANDLER
120  IF  PEEK (512) = 0 THEN A = DE: GOTO 80
130  PRINT  CHR$ (7);"ERROR --- TRY AGAIN"
140  GOTO 50
150  ONERR  GOTO 110
160  REM  STANDARD ONERR PATCH
170  FOR I = 965 TO 974
180  READ J: POKE I,J
190  NEXT : RETURN
200  DATA  104,168,104,166,223
210  DATA  154,72,152,72,96
```

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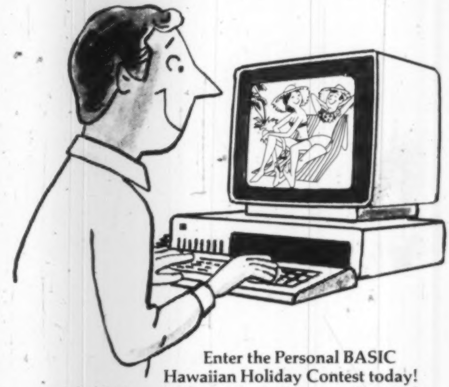

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Mercury Mine Corrected

You may have noticed that there is no regular boo-boo department within the pages of *Creative Computing*. This is because such a feature is usually unnecessary.

Such was not the case with "Mercury Mine" for the Atari, which appeared in our October issue. As printed, the listing will not run.

The correct program appears below. We apologize to our Atari readers for the error.

```
1 GRAPHICS 0
5 DIM A$(512),B$(20)
7 X=X+1:READ A:IF A<>-1 THEN B$(X,X)=CHR$(A):GOTO 7
9 DATA 0,250,250,250,250,250,250,250,250,250,250,0,-1
12 POKE 559,62:POKE 704,0:POKE 705,84
15 I=PEEK(106)-16:POKE 54279,I
18 POKE 53277,3
20 VTAB=PEEK(134)+256*PEEK(135)
22 ATAB=PEEK(140)+256*PEEK(141)
24 OFFS=I*256+1024-ATAB
26 HI=INT(OFFS/256):LO=OFFS-HI*256
28 POKE VTAB+2,LO:POKE VTAB+3,HI
30 Y=60:Z=100:V=1:H=1
33 A$(Y,Y+11)=B$:POKE 53248,Z
38 IF Y>213 OR Y<33 THEN V=-V
40 HOR=53248:PRIOR=623
42 POKE HOR,220:A$(213,224)=B$:POKE HOR+1,220
70 DIM B1$(40),C$(5),C(4,2),CR$(11),D$(10),SC(4),E$(40),A1$(40),FAC$(20)
72 SIZEPO=53256
73 CHAR=1000:MINE=2000:START=3000:INSTR=4000:SCORE=2520:CLINK=5000:AI=9000
75 CR$="1234EWNS":FAC$="N NEE SES SWW NW":DIM FC1$(19),FIN$(4),POT(8):FIN$="1234"
77 FC1$="NWW SWW   S NEE SE"
78 B1$(1)=" ":B1$(40)=" ":B1$(2)=B1$
80 FOR I=1 TO 4:SC(I)=0:NEXT I
82 GOSUB 600
85 GOSUB START
88 GOSUB MINE
92 SC=PEEK(88)+256*PEEK(89)
95 POKE 703,4
100 FOR I=1 TO PS:IF B1$((I-1)*10+1,(I-1)*10+8)="COMPUTER" THEN GOTO AI
110 ? "↰WHAT IS THE MOVE FOR ";B1$((I-1)*10+1,(I-1)*10+9)
115 IF FG1=1 THEN GOTO 6000
120 ? "WHAT IS THE ROBOT NUMBER";:INPUT D$
130 FLG=0:FOR K=1 TO 4:IF D$(1,1)=CR$(K,K) THEN R=K:FLG=1
140 NEXT K
150 IF FLG=0 THEN ? "THE ROBOT NAME MUST BE FIRST":GOTO 110
160 ? "WHAT IS THE ROBOT DIRECTION";:INPUT C$:C$(LEN(C$)+1)="   "
170 XDIR=0:YDIR=XDIR
190 IF C$(1,1)="S" OR C$(2,2)="S" THEN YDIR=+2
200 IF C$(1,1)="N" OR C$(2,2)="N" THEN YDIR=-2
210 IF C$(1,1)="E" OR C$(2,2)="E" THEN XDIR=+2
220 IF C$(1,1)="W" OR C$(2,2)="W" THEN XDIR=-2
230 IF XDIR=0 AND YDIR=0 THEN 160
240 NUG=0:Y=C(R,1):X=C(R,2)
245 X=X+XDIR:Y=Y+YDIR
250 Z=PEEK(SC+(Y)*40+X+1):IF Z<>96 THEN 300
260 NUG=NUG+1:GOSUB CLINK:POKE SC+(Y-YDIR)*40+(X+1-XDIR),0
265 POKE SC+Y*40+X+1,R+16
270 C(R,1)=Y:C(R,2)=X:GOTO 245
300 SC(I)=SC(I)+NUG
310 GOSUB 2700
320 IF SC(1)+SC(2)+SC(3)+SC(4)>60 THEN GOSUB 4000
500 NEXT I
510 GOTO 100
600 RESTORE 620
610 FOR I=1 TO 8:READ ER:POT(I)=ER:NEXT I:RETURN
620 DATA -82,-80,-78,-2,2,78,80,82
900 TOP=SC(1):WIN=1
910 FOR I=2 TO 4:IF TOP<SC(I) THEN TOP=SC(I):WIN=I
920 NEXT I
930 ? "↰THE WINNER IS ";B1$((WIN-1)*10+1,(WIN)*10)
980 FOR I=1 TO 1000:NEXT I
985 ? "↰DO YOU WANT TO PLAY AGAIN":INPUT B1$:IF B1$(1,1)<>"Y" THEN END
990 GOTO 85
2000 REM
2001 ? "↰":POKE 752,1
2010 A$="┌┬┬┬┬┬┬┬┬┬┬┬┬┬┬┬┬┬┐"
2020 ? A$
2030 A$="|♦|♦|♦|♦|♦|♦|♦|♦|♦|♦|♦|♦|♦|"
2035 E$="├┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┤"
2040 FOR I=1 TO 9:? A$:? E$:NEXT I
2050 A$="↑└┴┴┴┴┴┴┴┴┴┴┴┴┴┴┴┴┴┘"
2060 ? A$
2070 POSITION 31,2:? "NW N NE"
2080 POSITION 31,3:? "  \|/"
2090 POSITION 31,4:? "W ─┼─ E"
2100 POSITION 31,5:? "  /|\ "
2110 POSITION 31,6:? "SW S SE"
2115 POSITION 31,9:? "1 2 3 4"
2118 POSITION 33,11:? "SCORE"
2120 FOR I=1 TO PS
2130 POSITION 30,10+2*I:? B1$((I-1)*10+1,(I-1)*10+9)
2140 POSITION 30,11+2*I:? INT(SC(I)):NEXT I
2190 FOR I=1 TO 4
2200 POSITION C(I,2)+1,C(I,1):? CR$(I,I)
2210 NEXT I
2250 RETURN
2700 FOR N1=1 TO PS
2710 SPOT=SC+(11+2*N1)*40+30
2715 SN1=INT(SC(N1)/10)
2718 IF SN1=0 THEN POKE SPOT,0:GOTO 2730
2720 POKE SPOT,SN1+16
2730 POKE SPOT+1,INT(SC(N1)-SN1*10)+16
2740 NEXT N1:RETURN
2810 IF SN1=0 THEN 2730
3000 ? "↰DO YOU WANT INSTRUCTIONS":INPUT C$
3010 IF C$(1,1)="Y" THEN GOSUB 3500
3020 ? "↰":? "HOW MANY PLAYERS WILL THERE BE         UP TO 4";:INPUT PS
3025 IF PS>1 THEN 3060
3028 PS=2
3030 ? :? "DO YOU WANT TO GO GO FIRST AGAINST    THE COMPUTER";:INPUT C$
3040 IF C$(1,1)="Y" THEN ? :? "WHAT IS YOUR NAME";:INPUT D$:B1$(1,9)=D$:B1$(11,19)=
     "COMPUTER":GOTO 3090
3050 IF C$(1,1)="N" THEN B1$(1,9)="COMPUTER":? :? "WHAT IS YOUR NAME";:INPUT D$:B1$
     (11,19)=D$:GOTO 3090
3060 FOR I=1 TO PS:? :? "WHAT IS THE NAME OF PLAYER ";I;" :";:INPUT D$
3070 B1$((I-1)*10+1,(I-1)*10+9)=D$:NEXT I
3090 FG1=0:? :? "DO YOU WANT TO USE THE JOYSTICK":INPUT D$:IF D$(1,1)="Y" THEN FG1=1
3100 FOR I=1 TO 4
3110 X=INT(RND(0)*9+1):Y=INT(RND(0)*13+1):X=X*2:Y=Y*2
3120 IF I=1 THEN 3160
3130 FOR J=1 TO I-1:IF X=C(J,1) AND Y=C(J,2) THEN 3100
3140 NEXT J:C(J,1)=X:C(J,2)=Y
3160 C(I,1)=X:C(I,2)=Y
3180 NEXT I
3220 RETURN
3500 ? "THERE ARE FOUR ROBOTS WORKING IN A    MINE IN THE PLANET MERCURY.  THEY ARE
     CALLED 1, 2, 3, AND 4."
3510 ? "AS THEY MOVE, THEY PICK UP DIAMONDS.  YOU CAN TELL ONE ROBOT TO MOVE AND"
3520 ? "PICK UP THE DIAMONDS IN HIS PATH UNTILTHERE ARE NO MORE DIAMONDS IN HIS WAY."
3530 ? "YOU MUST TELL THE ROBOT WHICH DIREC-  TION TO MOVE.  THE PERSON WITH THE
       MOST DIAMONDS WINS."
3540 ? :? "DO YOU WISH TO SEE THE BOARD":INPUT D$
3560 IF D$(1,1)="Y" THEN GOSUB 3100:GOSUB 2000:POSITION 1,23:? "PRESS RETURN TO CON
     TINUE":INPUT D$
3580 ? "TO MOVE A ROBOT, TYPE ITS NUMBER AND  THEN TYPE THE DIRECTION THE ROBOT IS
      TO GO TO."
3590 ? "USING THE JOYSTICK, MOVE THE JOYSTICK UNTIL THE SQUARE IS ON THE ROBOT OR
       DIRECTION WANTED.  THEN PRESS"
3595 ? "THE TRIGGER.  THE CHOICE WILL STAY ON THE SCREEN"
3600 ? :? "PRESS RETURN TO CONTINUE":INPUT D$
3700 RETURN
4000 FOR REL=1 TO 4
4005 IF VAL(FIN$(REL,REL))=0 THEN 4500
4010 X=C(REL,2):Y=C(REL,1)
```

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Mercury Mine, continued...

```
4320 OT=SC+Y*40+X+1:MOV=0
4340 FOR KK=1 TO 8;IF PEEK(OT+POT(KK))=96 THEN MOV=1:GOTO 4355
4350 NEXT KK
4353 IF MOV=0 THEN FIN$(REL,REL)="0"
4355 IF VAL(FIN$)=0 THEN GOTO 900
4500 NEXT REL:RETURN
5000 FOR LM=1 TO 6:FOR KM=65 TO 35 STEP -3:SOUND 0,KM,10,10:NEXT KM:NEXT LM:SOUND 0,0,0,0:RETURN
6000 A$(1)="♥":A$(512)="♥":A$(2)=A$
6003 ? "THE ROBOT NUMBER IS ";
6005 POS=0:Y=101:POKE HOR,171:A$(Y,Y+11)=B$:HR=171
6010 IF STICK(0)<>15 THEN HR=HR+8:POKE HOR,HR:IF HR>195 THEN HR=171:POKE HOR,HR
6013 FOR J=1 TO 50:NEXT J
6020 IF STRIG(0)=1 THEN 6010
6030 R=INT((HR-171)/8)+1:? R
6035 ? "THE DIRECTION IS ";
6038 FOR M=1 TO 100:NEXT M
6050 Y=304:POKE HOR+1,172:HR=172:A$(Y,Y+11)=B$
6060 IF STICK(0)<>15 THEN POS=POS+1:IF POS<9 THEN GOSUB 6500
6062 IF POS>8 THEN POS=1:GOSUB 6500
6068 FOR M=1 TO 25:NEXT M
6070 IF STRIG(0)=1 THEN 6060
6080 C$(1,2)=FAC$(POS*2-1,POS*2):? C$(1,2):GOTO 170
6500 POKE SIZEP0+1,0:IF INT(POS/?)=POS/2 THEN POKE SIZEP0+1,1
6520 ON INT((POS+1)/2) GOTO 6600,6700,6800,6900
6600 HR=HR+11:POKE HOR+1,HR:FOR M=1 TO 25:NEXT M:RETURN
6700 FOR M=Y TO Y+16:A$(M,M+11)=B$:NEXT M:Y=Y+16:RETURN
6800 HR=HR-11:POKE HOR+1,HR:FOR M=1 TO 25:NEXT M:RETURN
6900 FOR M=Y TO Y-16 STEP -1:A$(M,M+11)=B$:NEXT M:Y=Y-16:RETURN
9000 MAX=0
9005 ? "KTHE MOVE FOR COMPUTER "
9010 FOR II=1 TO 4:POS=0
9030 FOR XDIF=-2 TO 2 STEP 2
9040 FOR YDIF=-2 TO 2 STEP 2:CNT=0:POS=POS+1
9043 X=C(II,2):Y=C(II,1)
9050 X=X+XDIF:Y=YDIF+Y
9060 OS=SC+Y*40+X+1
9065 IF PEEK(OS)<>96 THEN 9100
9070 CNT=CNT+1:GOTO 9050
9100 IF MAX<CNT THEN MAX=CNT:IB=II:XB=XDIF:YB=YDIF:PS=POS
9110 NEXT YDIF:NEXT XDIF:NEXT II
9120 XDIR=XB:YDIR=YB:R=IB
9122 ? "THE ROBOT NUMBER IS ";R
9124 ? "THE ROBOT DIRECTION IS ";FC1$(PS*2-1,PS*2)
9130 GOTO 240
```

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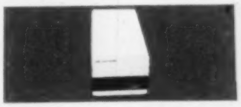

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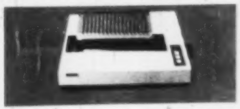

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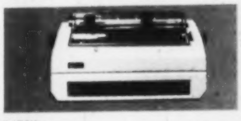

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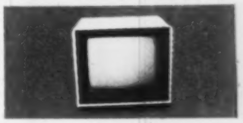

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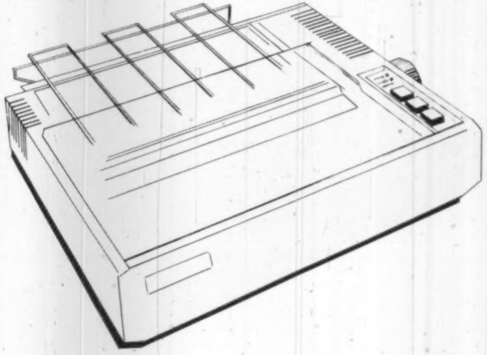


Print About Printers

John J. Anderson

Among other things this month, we shall review three different printers, including a new low-cost color machine. Two of the machines are follow-up entries on existing models, while the third is a newcomer. We shall go on to examine the technology of color ribbons, and take a look at yet another smart buffer device. So let's get going.

Ink-Jet Update

In the May 1983 *Creative,* we offered a preview of the Canon A-1210. At first glance, it looked like just another compact dot matrix printer. Such was not the case. It printed in *seven colors* with under 50dB quietude characteristic only of ink-jet technology. We were somewhat excited.

Now the Canon A-1210 has managed to reincarnate itself as the Radio Shack CGP-220. Those savvy buyers in Fort Worth have done it again. At $700, the printer represents a dramatic breakthrough in ink-jet as well as color printing technology.

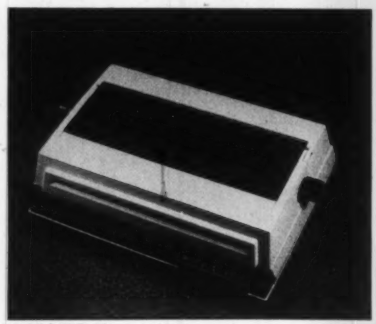
The graphics specifications of the machine are 40 cps speed in the text mode and 2600 dots per second in color scan mode. Resolution is 560 monochrome dot columns per line in the standard bit image mode and 640 dots per line in the multi-color mode. The unit uses what the manufacturer calls a "drop-on-demand" process color ink cartridge. It is available in parallel or serial versions.

An in-depth review of the printer will appear in an upcoming column.

SCM TP Take II

In our March 1983 issue, we reviewed the Smith Corona TP-I daisy wheel printer—not very favorably, I might add.

SCM recently introduced the new TP-II, which set out to redress some of the problems of the original model, and succeeds on many points. The TP-I could work optimally only on friction-fed single sheets. An optional tractor-feed mechanism on the TP-II allows use of continuous-form paper without incurring skew jams. The new unit also offers an RS-232 serial as well as Centronics parallel interface.



SCM TP-II

The quality of the hardcopy output by the TP-II is impeccable (see Figure 1). Interchangeable daisy printwheels offer a full range of typefaces. The internal fan, which was very noisy on the original unit, has been quieted down quite a bit. The printer has software programmable underscore modes, margins, and tab settings. The DIP switches on the unit are easier to reach. The documentation is now much more complete, offering technical information on cabling, handshaking protocols, and DIP selection.

The multistrike cartridge ribbon supplied with the machine is a snap to change and provides superlative print quality. Fabric (better wear, worse print impression) and mylar film (dispose after one pass, excellent print impression) ribbons are also available for the unit.

Then there is the downside. The TP-II veritably crawls along at a generous estimate of 12 cps. The printhead is still unidirectional, meaning it returns to the left margin on every linefeed, without lgoic-seeking. The result of all this is that a page of printed text takes about as much time to create on the TP-II as it would take a good typist to bang it out. That is rather slow by micro standards.

But then again, all daisywheel printers are slow. What is really torturous about the TP-II is that it is nearly as noisy as its predecessor. Though the new model cabinet has been sound-insulated with strips of foam, the clatter of the machine is still unnerving. Waiting over three minutes a page at 70dB in typical conditions might pose a problem to the sound-sensitive. As was true with the TP-I, the plexiglas cover must be open when the machine is in use. Its closed function is as a dustcover or to keep your lunch from falling into the mechanism when not in use.

The unit we tested shook its printer stand rather violently. The documentation states that the cabinet feet have a tacky surface to "prevent the machine from walking." It's a good thing—this baby really wants to walk. If you mounted it on casters, you might be able to get it to take the dog out for you.

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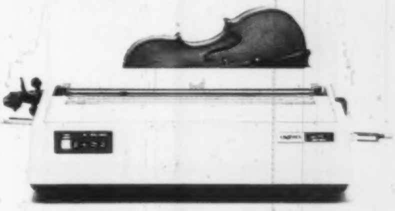

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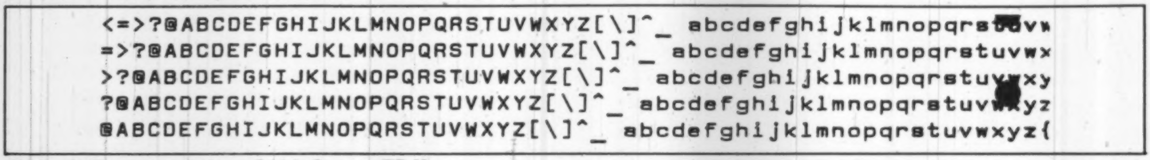

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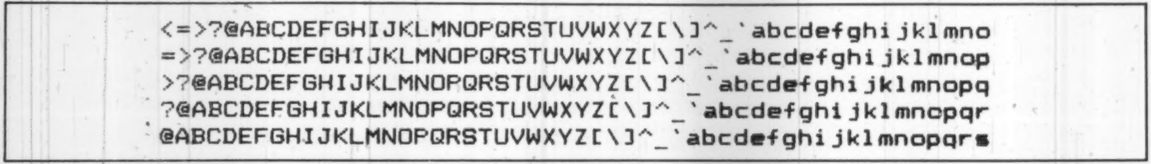
Figure 1. Type sample from Smith Corona TP-II.



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```

Figure 2. Type sample from Epson FX-80.

The print buffer size of the TP-II remains exactly the same as the TP-I: 256 characters. This is about the smallest buffer to be found on any printer over $500. Plan on an external buffer for this machine (like the one described up ahead).

Self-testing the TP-II? Fine—go ahead. But make sure you have 13" paper—not 8½" paper—loaded in. Otherwise you will end up typing on the righthand side of the platen, as we did. Definitely a no-no.

The SCM TP-II lists for $895. You can find a much better price if you shop around.

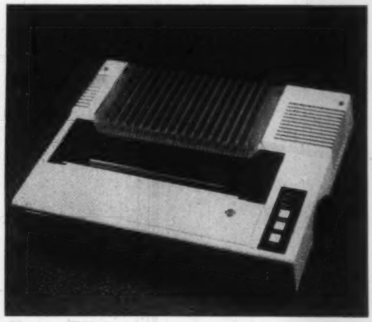
Epson FX-80 Tops Itself

We've been wanting to review the Epson FX-80 for months and months, but snags with Epson delayed a unit. Finally one surfaced with a QX-10 micro at the lab, and it met nearly all our expectations, except the ones it surpassed.

The Epson MX-80, one of the most ubiquitous micro printers around, was a tough act to follow. Epson has managed to do it by packing the FX-80 chock full of special features. It features six different print pitches, Roman and italic fonts, two types of boldface, proportional spacing, programmable horizontal and vertical tabs, skip-over-perforation, user-definable character sets, hi-res monochrome graphics capability, friction as well as pinfeed paper handling, and a typewriter simulation mode.

The FX-80 is upwardly compatible with all Graftrax Plus features. Its DIP switches are conveniently located, and it sports a 2K buffer. Sub- and superscripts are no problem, nor are reverse linefeeds. Paper can be backed up as well as advanced using the platen knob, without risking a paper jam. It is relatively quiet for its kind, though it seems no quieter than its predecessor (give it a break—it is appreciably faster than its predecessor).

How fast is it? Glad you asked. The FX-80 is rated at 160 cps in its fastest font (see Figure 2). That, combined with bidirectional, logic-seeking linefeeds, adds up to speed. That same page that took the TP-II three minutes takes the FX-80 under 30 seconds. And at the same noise level as many 40 cps machines.



Epson FX-80

Want to talk about documentation? Okay. The redrawn documentation accompanying the Epson FX-80 is quite simply the finest printer documentation I have ever seen. It weights in at 323 pages, not including the laminated cardstock quick-reference card. The text is clear, complete, thoroughly indexed, and amusing without being "cutesy" (see Figure 3). It is full of actual FX-80 programming examples, and everything you need to know is easily accessible within its covers. How refreshing!

> WELCOME TO FX-80 ADVENTURE!
>
> YOU ARE STANDING IN THE FAMILY ROOM NEXT TO YOUR COMPUTER DESK. THE KIDS ARE ACROSS THE ROOM PLAYING A VIDEO GAME ON THE TV. ON YOUR DESK IS A LARGE BOX WITH LETTERING.
>
> YOUR COMMAND? *read lettering*
>
> THE BOX IS LABELED "EPSON"
>
> YOUR COMMAND? *open box*
>
> INSIDE THE BOX YOU FIND A BRAND NEW FX-80 PRINTER.
>
> A USER'S MANUAL FALLS TO THE FLOOR.
>
> AN EERIE VOICE (YOUR CONSCIENCE MAYBE?) WHISPERS: "READ THE MANUAL FIRST."
>
> YOUR COMMAND? *ignore manual: connect printer to computer*
>
> KABOOOOM! THE PRINTER EXPLODES, VAPORIZING EVERYTHING WITHIN 5 FEET OF THE DESK. THE KIDS CONTINUE BLASTING ALIENS ON THE TV, UNAWARE OF YOUR FATE.
>
> YOU ARE DEAD. PLAY AGAIN?
>
> The result is admittedly exaggerated, but the underlying message is very clear: when all else fails, READ THE MANUAL!!
>
> This advice is too late for our unfortunate adventurer, but who can blame him? It is always tempting (though not always wise) to start playing with a new printer the instant it is out of the box. The FX-80 is an advanced printer, complete with state-of-the-art features that can be adjusted to fit your particular needs. So it is more important than ever that you fully understand what the printer will do and how to make it do it before you flip the KABOOM switch.

Figure 3.

The FX-80 has a bigger "footprint" (one of Dave's favorite terms) than the MX-80, and requires more desk space than most other printers in its class. On the plus side, five inches is more than enough height clearance for the machine—an important consideration if you are stacking components on shelves.

Virtually the only complaints I have about the FX-80 concern paper feed. Loading paper in the unit is an exercise in extrasensory perception. You insert paper on the rear side of the platen, turn the knob, and hope for the best. It will appear on the near side either perfectly registered and ready to go, or badly mangled and ready to cause expletives. Backing up from this state is messy. Tear off the shreds and try again with a fresh edge. Loading paper on an FX-80 is a good measure of your grace level for the day.

The other paper peculiarity is the fact that the pin feed rollers can be moved only about an inch in either direction. To run narrow address labels, you will require the tractor feed option—about $40. And don't try backing up on labels—you'll be asking for trouble.

The Epson FX-80 lists for $700, but is also heavily discounted.

FX Meets PC

Set-FX, from Softstyle, will be of special interest to IBM PC owners who acquire Epson FX-80s. *Set-FX* enables the FX-80 to print the full IBM character set as it appears on the screen, including line graphics, foreign languages, and math and science symbols. It also allows

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menu-based selection of special print modes.

In addition, the program includes a custom font generator and FX-80 Ideas, a demo showing some of the special capabilities of the FX-80 and *Set-FX*.

The *Set-FX* disk lists for $60.

Transtar Quality

With the possible exception of the new Radio Shack CGP-220, the Transtar T-315 has got to be the most exciting low-priced dot matrix color printer around. It uses a color ribbon to achieve its seven colors. The ink ribbon cassette has individual cartridges that can be replaced as a specific color is used up. Colors can be specified in any of three ways:

- Character units or eight-dot vertical graphics columns.
- Single-dot units scanning horizontally corresponding to RGB. This allows for color screen dumps.
- Single dot units scanning horizontally corresponding to the four hammers in the printhead.

This flexibility gives the T-315 very impressive capabilities. If you own an Apple computer, the T-315 is even more attractive bundled with the PICS interface card. The card allows for lo- and hi-res screen images to be printed at the press of a button (see Figures 4, 5, and 6).

On the top panel of the T-315 is a button labeled "copy." After initializing the Transtar on your Apple system, you can boot any graphics program, protected or not, then print screens out in full color by pressing the button and hitting the Apple spacebar. By toggling other keys on the Apple, you can expand across horizontal or vertical axes, or both. You can center the output or keep it on the left margin. You can invert from white to black and back again. You can choose a dual-pass mode.

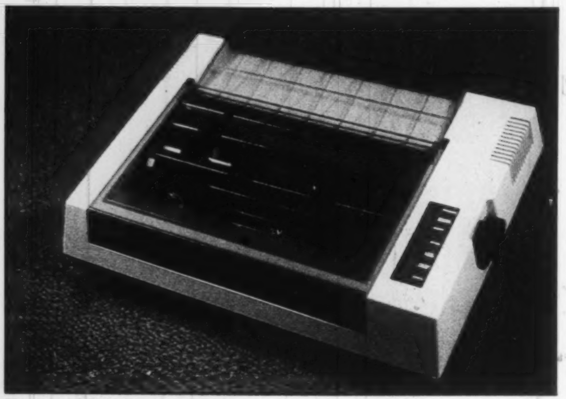
The Transtar 315 uses a novel approach to indicate "on-line" status. On-line is the default mode upon power up. To go off line, press the "stop" button. Now an indicator light comes on, and pushbutton line and form feeding is possible, as is manual paper advance (paper *cannot* be moved backward once advanced). Press the "stop" key once again to return to on-line status.

For an impact dot-matrix printer, the T-315 is quiet. For a color impact printer, it is very quiet. When the cover on this machine is closed during operation, you can conduct a conversation in ordinary tones of voice.

As is a problem with most other low-priced color printers, the T-315 is perhaps not as good a black-and-white-printer as are similarly priced black-and-white-only models. The text print quality seems a bit anemic next to the output of an Epson or Mannesmann Tally machine (see Figure 7). Still, it is serviceable—and see how text can look in seven colors (Figure 8).

Another thing to bear in mind if you are using a color printer for heavy black-and-white output is that the ribbon will exhaust itself more quickly, as black represents only a quarter of the ribbon. The replaceable ink cartridges attempt a solution to this problem. It is likely that black is the color to be replaced most often. (A further discussion of color ribbons occurs just ahead.)

The Transtar 315 lists for $600, and



Transtar T-315.

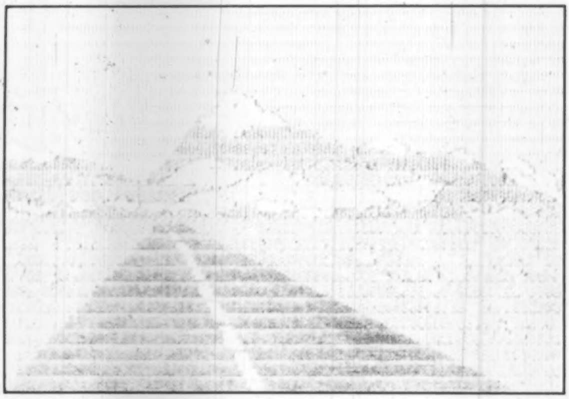


Figure 4.

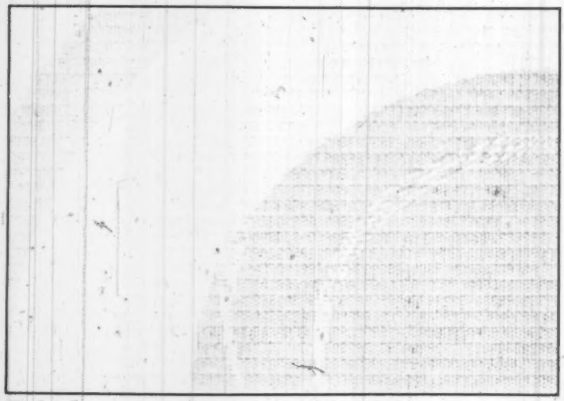


Figure 5.

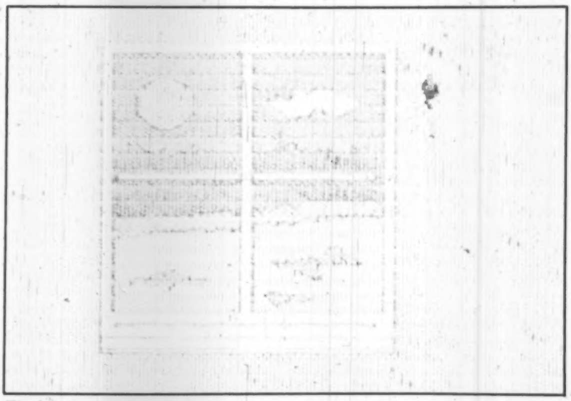


Figure 6.

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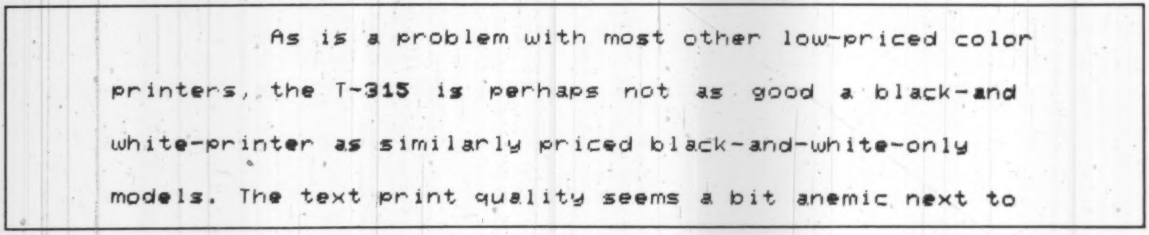

As is a problem with most other low-priced color printers, the T-315 is perhaps not as good a black-and white-printer as similarly priced black-and-white-only models. The text print quality seems a bit anemic next to

Figure 7. Type sample from Transtar T-315.

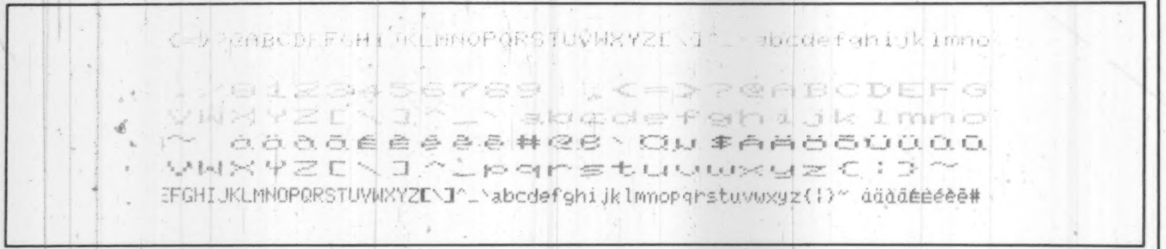

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Figure 8. Color type from Transtar T-315.

the PICS Interface for $120, thus making the system the least expensive around for obtaining color Apple hardcopy. If you are looking for this capability, the package should be at the top of your shopping list.

Slicing Into Ribbons

How significant will the coming of low-end color printers be? Some in the industry have drawn a parallel to the introduction of color TV and predict that someday soon color printers will be the standard of micro systems everywhere.

This may or may not be true. Certainly the *quality* of these machines will have a lot to do with their acceptance in the marketplace. I have yet to see a printer with all the black and white capabilities of, say, the Mannesmann MT-160, and color, too. That day will have to come before many folks make the jump to a color printer.

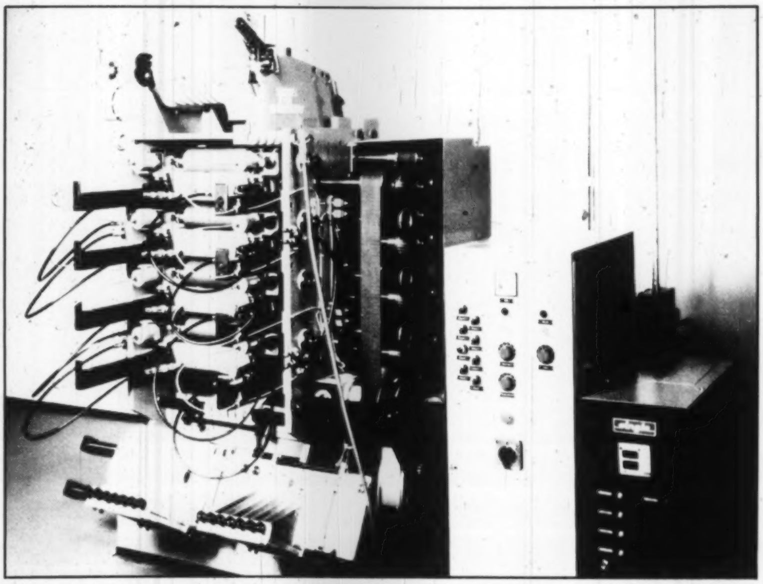
Certainly the technology of printer ribbons has had much to do with the advent of color printers. The Canon/Radio Shack ink-jet machine represents a new direction in ribbonless printing, and, frankly, brings with it a new set of problems. Will color ink-jet technology sound the knell for color ribbons? Probably not—at least for the foreseeable future.

The Transtar 315 ribbon represents advances in existing ribbon technology, but is nonetheless heir to all the problems ribbons can pose. Its advantage is that these problems are not new, and some people have been giving them a lot of thought.

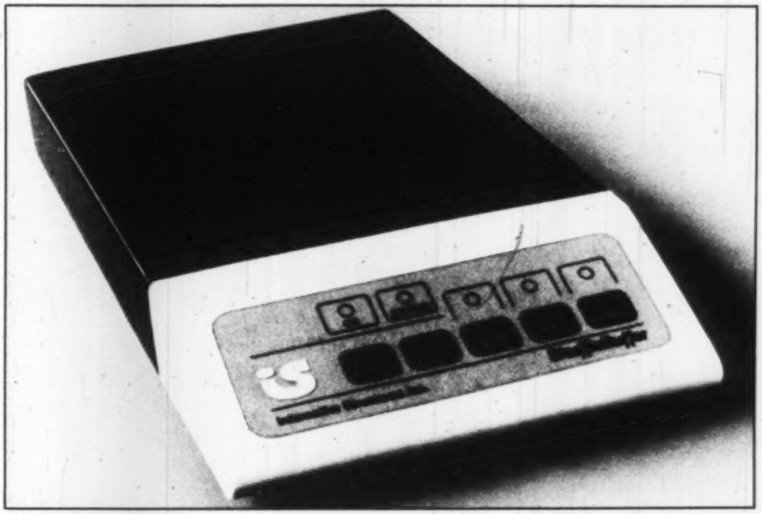
Multi-color ribbons have come a long way. The first color printers used a "primary" ribbon, of red, yellow, blue, and black, and were limited to these colors. A "process" ribbon, such as that employed in the Transtar, uses four colors: magenta, yellow, cyan, and black. Using a strikeover technique, these can be mixed and patterned to form other colors. Easy examples: magenta and yellow make red; yellow and cyan make green; and magenta and cyan make purple. With a process ribbon, a printer can approximate all the colors a color monitor can output.

The problem is creating a color ribbon that lasts. A major obstacle to producing multicolor ribbons is maintaining the integrity of each color band. It is essential that the colors not blend or run together not only during manufacturing, but for the life of the ribbon. Color ribbons sometimes seem underinked even as they come out of the box because the manufacturer is attempting to minimize the possibility of allowing inks to come together.

Until now the technique of repelling inks has been used, with varying degrees of success. Now Dataproducts, of Chatsworth, CA, has taken a new approach.



One of the machines developed by Dataproducts Supplies Division to make new color ribbon.



ShuffleBuffer.

They have developed flexible plastic barriers to keep the inks separate from one another. With the flexible barrier system, color ribbons can be maximally saturated with no chance of bleeding.

According to Dataproducts, the flexible barrier system can withstand repeated contact with a printhead without breaking down. Nor will it cause ribbon slippage in the drive mechanism. They will market ribbons for all models of color printers. We look forward to testing these ribbons soon. We will let you know what we think.

ShuffleBuffer Zone

The latest entry to the smart buffer zone is ShuffleBuffer from Interactive Structures. It is compatible with all micros having a standard serial or parallel output port.

The unit has the capability to "shuffle" text, graphics, spreadsheet information, and any other computer-generated material into any desired combination for printing, plotting, or telephone transmission. The result is software integration for even the most humble systems.

The buffer has a standard "dumb buffer" mode, wherein documents that don't need rearranging or reprinting go out FIFO (first in, first out). This frees the CPU for further use during long printouts. An additional mode is "Bypass," allowing the interruption of a long printout to produce a separate document on an immediate basis, then return to printing the original document.

Pricing and memory capacity of the ShuffleBuffer had not been announced at press time.

Next month we will look at the proud track record of Oki printers and review the Toshiba D1350, one of the best dot matrix printers on the market today. Until then, keep your ribbons inked! END

Firms Mentioned In This Column:

Radio Shack
300 One Tandy Center
Ft. Worth, TX 76102
(817) 390-2842

Smith Corona
65 Locust Ave.
New Canaan, CT 06840
(203) 972-1471

Epson America
3415 Kashiwa St.
Torrance, CA 90505
(213) 534-0360

Softstyle
Suite 200
7192 Kalanianaole Hwy.
Honolulu, HI 96825
(808) 396-6368

Transtar
2100 116th Ave. N.E.
Bellevue, WA 98009
(206) 454-9250

Dataproducts
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Chatsworth, CA 91311
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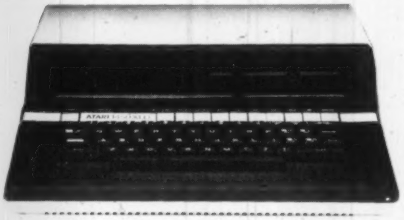
Our awards for the best and worst of 1983.



Outpost: Atari

Arthur Leyenberger

It is that special time of the year. Time for New Year's resolutions, wild orgies, and other behavior that most sane people would not be caught doing during the rest of the year. It is also a time for journalists, critics, and other soothsayers to come up with a list of the year's best. Whether the topic is movies, football games, or software, there is a surfeit of lists from every imaginable source.

At the risk of being labeled a curmudgeon I will add my own list to the bevy. The topic will be light so that you can concentrate on the important things like partying and carrying on. We Atari owners know we have the best game playing computer on the market. Its sound and graphics capabilities are rivaled by none. Although our machines are capable of more serious endeavors, we of the faith take gaming seriously. In the next few pages will be the 1983 Outpost: Atari Game Awards, or as I call them, the "Outies." But before we get to that, allow me to take care of a little business.

Look Out Adam, It's Eve

The Coleco Adam has been getting a great deal of press for the past several months. First they could meet their original deadline, then they couldn't, then they changed the deadline. I got tired of trying to keep up with the Adam saga. Apparently I was not alone. An enterprising retailer in Cedar Knolls, NJ has been selling since mid-October a packaged Atari system he has dubbed Eve. For under $600, Gemini Enterprises is offering an Atari 600XL computer, Atari 1027 letter quality printer, Atari 1010 cassette recorder, and the *Atariwriter* word processor. Atari has an official version of a similar system package called the Writer, but it does not include the 1010 cassette recorder.

Eve is a nifty package. Not only is the price right, *Atariwriter* is, in my opinion, the best word processor for the Atari. (For a thorough description of *Atariwriter* see my review in the November 1983 *Creative*). When using *Atariwriter* with the 16K Atari 600XL, you still have about 10K of memory in the machine available for text. This translates to about 20 double-spaced typed pages—more than enough for most term papers and reports.

Normally, using a cassette recorder is not the preferred method of data storage because the speed of loading and saving files is terribly slow. But here it is no problem. There is no reason to access the recorder while you are performing your word processing. Only when you want to save a file or load a previously created file will you suffer the speed penalty.

Another plus for this particular selection of components is that the Atari 1027 printer does not require the Atari 850 Interface Module. It attaches directly to the serial interface daisy chain. And it has a good quality output for an inexpensive printer.

While the speed of the printer is almost an order of magnitude slower than the fastest dot-matrix printer, it will probably fit the needs of many users. It may be best suitable for someone who is not sure he wants to do a great deal of word processing and therefore does not require high speed output. At the same time, the results are truly letter quality. The Atari 1027 printer offers bidirectional printing, underlining capability, a speed of 20 characters per second, and 12 fully formed characters to the inch.

I have only two criticisms of the Atari 1027 printer. First, it lacks pinfeed paper capability. It handles only single sheets of paper. This is fine for typing a letter to Aunt Emma, but is somewhat inconvenient for program listings. My other complaint is the price. It generally sells for about $300. This is about $100 too much considering a generic dot-matrix printer can be had for about the same sum. A lower price would be more competitive and perhaps win back some of Atari's sagging sales.

All things considered, I believe this Eve package to be very tough competition for the Coleco Adam. When you throw in the thousands of existing Atari programs that are available, I don't think Coleco has a chance.

Atari XL Compatibility

There has been much talk about the new Atari XL computers. Rumors have been more prevalent than facts. One of the major points of concern (even in past Outpost columns) has been the question of compatibility. The type of operating system for the new machines was unknown. Would they have the 400/800 Operating System, or would they have the less than popular 1200XL Operating

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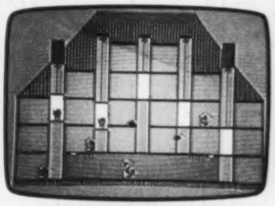

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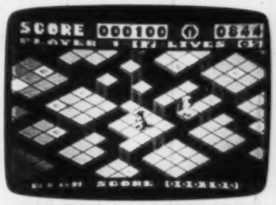

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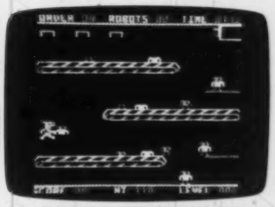

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Outpost: Atari, continued...

System? All existing software can run on the former, but much of it cannot run on the latter.

The facts are in, and there is some good news and bad news from Atari. The bad news is that the XL computers have the 1200XL Operating System and therefore a great deal of software will not run on them. The good news is that there will be a "Translator disk" (and cassette version) available from Atari that will modify the Operating System in the XL machines to look like the 400/800 OS. If this comes to be, one of my Christmas wishes from last month's Outpost has been granted.

Atari Rebuttal

John Anderson, my predecessor as author of this column, was quite vocal in past Outpost columns about Atari products and practices. His critical comments were intended not to slander Atari but rather to stimulate them to change. I share many of his views, but Atari has taken exception to certain points. In an effort to be fair and to present their opinion, column space this month is being made available for Atari to tell their side of the story (see the sidebar). I will wait until next month to comment on their remarks.

With that behind us, let's move on and have some fun.

The 1983 Outpost: Atari Computer Game Awards

Some video game magazines present dozens of award categories. I—and most people I know—have difficulty dealing with that kind of video game overload. Instead, I have simply chosen eight categories that best represent the various types of games for the Atari computer. In each category I have chosen a winner and a runner-up. To qualify as an entry, a game had to be available for the Atari computer in 1983.

The following list is based upon my own set of criteria. These include the overall quality and playability of the game, its use of sound and graphics in appropriate ways and the extent to which the game utilizes the capability of the Atari computer. I have spent many hours behind a joystick playing these games and that is reflected in my choices.

Game of the Year

The 1983 Outie for best game goes to *Archon* by Electronic Arts. *Archon* has broken new ground in the video games world by combining the elements of a

Atari Responds

I would like to take this opportunity to respond to some of your comments in the Outpost: Atari column in the October issue of *Creative Computing*.

First, I would like to point out that our goal in Atari Customer Relations is to have consumers of our products be happy with their buying decision. As an expression of respect to consumers who contact Atari and to protect the credibility of our commitment to support them, we respond in as consistent, accurate, and timely a manner as possible.

Mr. Rose's letter to me asked if the information he had read in the July issue of *Creative Computing* was accurate. Specifically, the 1200 redesign with a return to the compatible operating system of the 400 and 800 and an expansion chassis. Mr. Rose wanted to know if owners of the original 1200 could have the enhancements added as a retrofit. My truthful and accurate response to Mr. Rose was that the 1200XL computer will not be redesigned and is continuing to be sold in its original configuration. There is nothing to retrofit.

Second, I would characterize your reference to the new XL computers as redesigns of the 1200 as strictly your own personal opinion which does not reflect Atari's view of these machines at all. From the point of view that they use the XL operating system, have the distinctive XL color scheme, and offer features found on the 1200, I would agree that they are in the same family. However, from the point of view that the design of the new computers was specified by a different management group in advance of any consumer reaction to the 1200, I would say the new machines are merely a natural evolution.

Furthermore, because of Atari's commitment to upward compatibility, all our home computers utilize the same chip set (6502, ANTIC, GTIA, POKEY, PIA, and generally the same OS) and should be considered to be in the same family. The point is that Atari is continuing to develop computers that offer features that the public wants at a price they can afford, and to characterize natural product evolutions as redesigns of previous models gives the impression that the previous models are flawed in some way. The 1200XL is a perfectly acceptable home computer for a great many people.

Third, I would like to clarify Atari's view of the compatibility issue. It is our responsibility to provide programming guidelines to outside software developers that should be followed to ensure compatibility with future revisions of the operating system. We have done that. Unfortunately, many popular titles did not work on the 1200XL. Realistically, it is impossible to expect 100% upward compatibility with any revision to an operating system. Atari feels the vendors should make revisions to their software to follow our established guidelines.

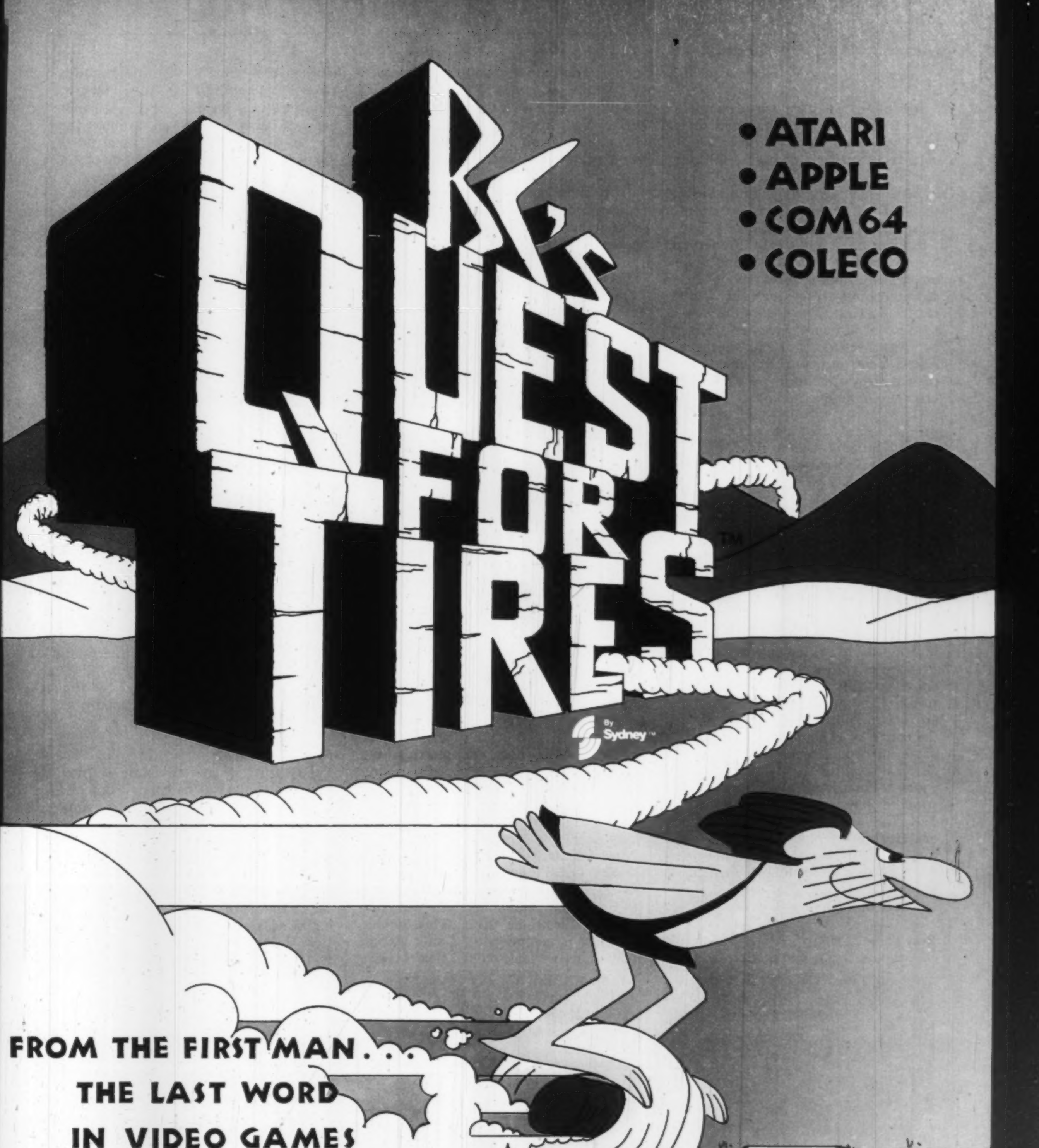
The vendors feel revision is justified only if a large number of new machines are sold or there are new hardware features that will enhance the utility of the software. The result is that the consumers of XL computers are caught in the middle with software that works on 800's but not on their computers. In response to this situation, Atari has developed the Translator diskette/cassette that will allow owners of XL computers to "pre-boot" the 400/800 OS into their XL computer and override the built-in OS providing compatibility.

The Translator is available now from Atari Customer Relations. Atari has established a company policy of maintaining upward compatibility for the XL line of computer CPUs and peripherals. The purpose of this policy is to keep people in the Atari family happy by having new hardware products compatible with their existing software libraries. Atari must rely on the cooperation of third party vendors to ensure the credibility of this policy.

In closing, I would like to assure you and your readers that Atari takes their comments very seriously regardless of the number of contacts. We recognize that a consumer company that is more responsive will be more successful. Atari's commitment to the consumer is demonstrated by the very existence, not to mention the size, of the Consumer Product Service division. We feel that we provide a level of service and personal assistance that is not equalled in our industry.

It is not necessary to instigate a letter-writing "campaign" to get our attention. Believe me, we prefer to communicate with consumers in a positive manner ("How may we help you?") rather than an adversary manner ("What are you going to do about it?").

William "Stonewall" Bartlett
Product Support Manager
Atari Customer Relations
1312 Crossman Ave.
Sunnyvale, CA 94088
(800) 538-8543 (outside CA)
(800) 672-1404 (inside CA)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Outpost: Atari, continued...

strategy game and an arcade shoot-'em-up.

Archon is an excellent example of what a computer game can and *should* be. There are already rumors that *Archon* is attracting a dedicated following and fast becoming a national craze. Tournaments are springing up here and there, and since the game is available for most micros, all can compete.

Runner-up: *Choplifter* by Broderbund for its challenge, playability and unique non-violent approach to shoot-'em-up scoring: points are awarded only for saving the hostages. The goal of the game is to rescue hostages in your joystick-controlled helicopter and return them to safety. Your purpose is to defend rather than destroy. Memories of the Iranian crisis are brought to mind.

Best Arcade Adaptation

This Outie must go to Atari's *Donkey Kong.* The scenario is simple: Mario must rescue his girlfriend who is being held captive by Donkey Kong. Mario is at the bottom of a pile of girders and ramps. His goal is to climb a series of ladders to reach the girl at the top. Donkey Kong attempts to thwart him by rolling barrels down the ramps. Mario can either jump over or smash the barrels.

Like the arcade version, there are four screens, each of increasing difficulty. Moving elevators, falling girders, and conveyor belts comprise the advanced screens. The graphics and sound effects are great. Animation is excellent, and the game is exhilarating. To call this game fun would be an understatement. *Donkey Kong* for the Atari computer is equal to the original in all important respects. It has a catchy tune, too!

Runner-up: *Q-Bert* by Parker Brothers. Faithful graphics and sound make this game a close second. The movement and playability are almost identical to the arcade version. And besides, *Q-Bert* is a cute little guy.

Best Shoot-'Em-Up

Although I am not proficient at this game, the ultimate shoot-'em-up to date is Atari's *Defender.* This is a high-quality rendition of the popular arcade game. Your mission is to defend the last humanoids from the alien kidnappers. You maneuver the laser-equipped ship up, down, left, and right. Smart bombs are used to destroy everything on the screen when the pace gets too hectic. Horizontal scrolling is the name of the game, with the radar display at the top of the screen always showing the whereabouts of the enemy.

You really have to experience the excitement, intensity, and playability of this excellent arcade adaptation for yourself. *Defender* can easily be played for hours at a time.

Runner-up: *Super Cobra* by Parker Brothers. Another arcade adaptation, this challenging game has attractive graphics and life-like sound effects, especially when heard through an amplifier and speakers. If you like *Caverns of Mars* but require more challenge, then check out *Super Cobra.*

Most Original

Necromancer by Synapse is an atypical game. The three game screens are more like acts of a play. Each has its own theme, yet are all part of a larger story. The animation throughout the game is unmatched by anything I have seen for the Atari, and the hauntingly beautiful music adds to the overall effect of the game. *Necromancer* gets high marks for playability, too.

Runner-up: *Worms?* by Electronic Arts for its good-looking graphics that are both fascinating and relaxing. We are talking mind-expanding games here. The game is also educational in that principles of geometry are readily demonstrated.

Most Innovative

This Outie must go to the game that essentially duplicates the user interface of an Apple Lisa: *Pinball Construction Set* by Electronic Arts. This unique interface is comprised of a split screen, containing a blank pinball field on one side and a variety of little pictures (icons) representing flippers, targets, bumpers, etc, on the other. A hand-shaped cursor is moved around the screen with a joystick to point to a particular icon, say a flipper. The object is then picked up and dragged over to the play field where it can be placed anywhere you want. All of the objects are assembled on the play field to create your very own pinball games.

All aspects of a pinball game can be created, edited, and saved for future use, including ball characteristics such as speed, elasticity, and gravity, title screens, scoring logic, and sound effects. You even get five complete sample games that you may play, modify, or simply use as examples of what can be done with this wonderful package.

The *Pinball Construction Set* is a pinball wizard's dream come true. An example of state-of-the-art software on the Atari computer. A virtual graphics *tour de force* and a video game classic.

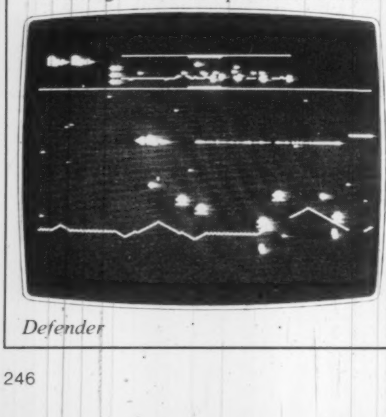
Runner-up: *M.U.L.E.* by Electronic Arts for its animation, challenge, and ingenuity. This imaginative game is really an economic simulation. Up to four players compete in an effort to monopolize the natural resources of an alien planet. The players buy, sell, and trade property in an attempt to amass the greatest wealth, and win. Animation is excellent, and there are many interesting complexities to the plot.

The design is well conceived and executed. The theme song has a good beat; you can dance to it; I'll give it a 98.

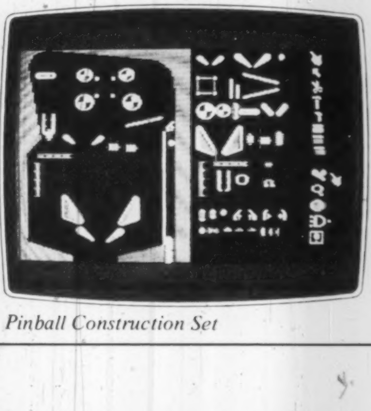
Most Challenging

To earn this coveted Outie, a game must not only be challenging but also repeatedly playable. In fact, the game should be so good that the Game Over display of one round automatically prompts another round much like the reaction of one of Pavlov's dogs.

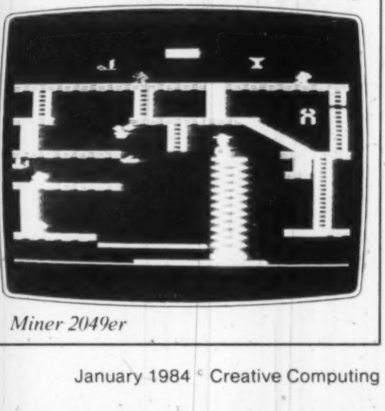
Miner 2049er by Big Five Software is such a game. In this climbing and jumping game, you move your player, Bounty Bob, throughout 10 different levels of a mine. Each screen increases in difficulty



Defender



Pinball Construction Set



Miner 2049er

as you race against time to complete all of the levels. Even in you finish all ten levels, you begin again at a faster pace. There are various hazards throughout the mine, and your goal is to traverse all of the platforms in each screen.

The graphics are very colorful and the joystick control is responsive. *Miner 2049er* is one of the few games that I have played all night long. And I still go back for more!

Runner-up: *Jumpman* by Epyx. A very close second, this similar jumping and climbing game has 30 screens worth of play. Although the graphics are less polished than *Miner's*, *Jumpman* is very playable and offers continuous challenge.

Best Graphics

This Outie is simply for the game with the best graphics. Playability and other variables are not being considered. There is a tie for the award between *A.E.* by Broderbund and *Astro Chase* by Parker Brothers. Both are shoot-'em-ups, but *A.E.* offers a little more variety. However, both offer dazzling graphics and animation. The best animation in *Astro Chase* occurs during the intermissions every four screens. The best animation in *A.E.* is the swirling and diving alien ships.

To be fair, each of these games should also get another award. The Outie for the most difficult game should go to *A.E.* It is really a tough game, and only the serious Atari gamer will put in the time to master it. The Outie for most hype should go to *Astro Chase* (with *Zaxxon* by Datasoft a close second). This game was originally marketed by First Star Software and was written by Fernando Herrera, winner of the first Atari Star Award. The latter fact was over-used and the game was advertised continuously for six months prior to its actual release in most of the computer magazines. Their slogan was "There is No Escape." What they did not mention was, from what? I now know—there is no escape from their hype.

The Atacky Award

The Atacky goes to the grossest Atari computer game we saw in 1983—the one that more than any other merits an airline sick sack. I am happy to report that it is no contest this year. And the winner is *Orc Attack* from Thorne EMI.

Not to say that *Orc Attack* is a bad game, because it is not. It is really quite playable. You control a medieval army, protecting the parapets of your castle from seige. Below, enemy hordes raise ladders and fire arrows at your defenders. The animation is gripping and the pace of the game is exciting.

It's just that a carefully aimed swing of your sword decapitates attackers, and you have the pleasure of watching their heads sail slowly back to earth in the breeze. Especially fun for the little ones.

Orc Attack is fun to play while eating, and sure to appeal to critics of the violence in video games. "Hats off" to Thorne for this heads-up approach. END

Firms Mentioned In This Column

Atari
Box 50047
San Jose, CA 95150

Big Five Software
Box 9078-185
Van Nuys, CA 91405

Broderbund
1938 Fourth St.
San Rafael, CA 94901

Datasoft
9421 Winnetka Ave.
Chatsworth, CA 91311

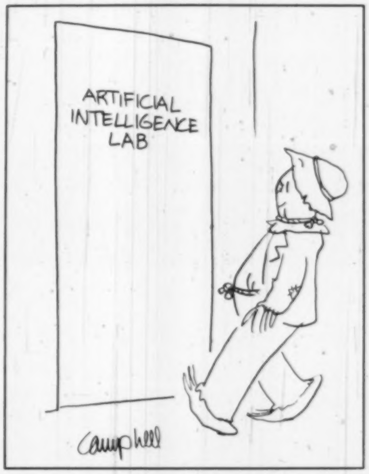
Electronic Arts
2775 Campus Dr.
San Mateo, CA 94403

Epyx (Automated Simulations)
1043 Kiel Ct.
Sunnyvale, CA 94086

Parker Brothers
50 Dunham Rd.
Beverly, MA 01915

Synapse
5327 Jacuzzi St., Suite 1
Richmond, CA 94804

Thorn EMI
1370 Avenue of the Americas
New York, NY 10019



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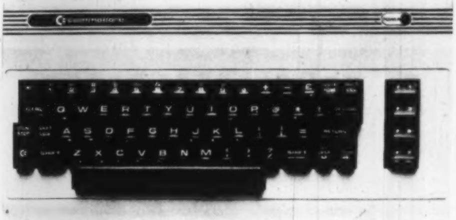

Commodore's Port

John J. Anderson

By this time you may or may not have come to terms with the fact that the coming year is numbered 1984. I know it has taken me a while to get used to the concept. And when you think about it, you must admit that we are much better off in 1984 than we might have been. Sure, there is plenty to worry about. But the nightmarish visions imagined for us by George Orwell have not really come to pass (except on Madison Avenue and selected locations in Washington D.C.). I know you might argue well to the contrary.

A Cause For Optimism

Still, I like to think that we are headed in more or less the right direction and that microcomputers have helped. In 1949, Orwell judged the coming age of computers from the intimidating point of view of the super-mainframe: he correctly saw the potential for the abuse of human rights through computerized loss of privacy. Indeed huge computers are used to aid surveillance of and maintenance of information about private citizens. In his quite penetrating prophecy about the dangers of our future, Orwell *did not* predict the ascendance of the micro.

Where the mainframe may sometimes be seen as a catalyst to the elimination of individualism, the micro pays tribute to the individual. It is a computer designed for use by an individual—hence the term "personal computer." It is yours, to do with what you please. Others may access only what you wish them to access.

Machines like the C-64 microcomputer give us reason to be a bit more optimistic about our futures and our children's futures. They stand as proof of the pleasures of computing, as opposed to the abuses (though even the telecommunications power of a C-64 can be used unethically). They stand as proof that computing belongs to *all* of us, as opposed to the Orwellian military-corporate complex (though many of them are buying C-64s too). Most of all, they show us that sometimes the most intimidating aspects of technology can be revealed to have an artful, wholly human potential—this tempers our fears.

Not to say we shouldn't remain wary. In deference to good old George O., I would agree strongly that the field of computing is as littered with "double-speak" as anyone might imagine. We would do well to keep his warnings in mind, for all aspects of modern life.

Enough philosophy for now. Let's get down to business.

The New C-64

Since I first became involved with Commodore computers, I have been a bit disturbed over quality control problems. In previous columns we have touched on problems of C-64 video quality, overheating disk drives, and monitor problems. Many C-64 owners have their own distressing stories to tell. We have heard from many of them.

We have also experienced problems with our own C-64s and drives too numerous to mention.

I am very happy to report that these problems have been largely solved. The display video of three recently acquired C-64s is so good it surprised me; it looks like that of a wholly new computer. Gone are all traces of the sparkle, fuzzy RF video, and color bleeds that once ruled out many color combinations. With the new machines, the advantages of a truly multicolor character set become obvious for the first time.

Commodore has acknowledged some problems with the 1541 disk drive, but these seem to have been ironed out completely. We sent back two drives for service and received two new drives in trade. Those drives have been in constant service at the lab for some weeks now and have evidenced no overheating or other problems. Regular shipments of the unit have now resumed, and you should be able to find one without too lengthy a search. According to Commodore, the demand for drives far outstripped original estimates, and it has taken until now to catch up.

We have noticed one flaky "feature." Occasionally it takes more than one try to locate a file on disk. If you get a FILE NOT FOUND error, try again before you panic.

According to one reliable source, Commodore has had some problems with production of its model 1701 color monitor as well. These should have been eliminated by the time you read this. The 1701 is one of the best buys around, and provides a picture of incomparable quality for the C-64. You *must,* however, use a video cable with an independent luminance lead. An Atari, Spectravideo, or TI monitor cable, as well as many third-party cables available with the correct connectors on each end, will commodore 64

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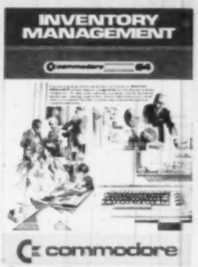
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not provide an optimal monitor signal for the C-64. If you have made the investment in a color monitor, at least make sure you are providing it with the correct cabling configuration.

If you are experiencing RF problems on a TV set, try replacing the video cable supplied with the C-64 with a highly shielded cable. Here at the lab the RFI as well as the fur is always flying. We use rev. 1 Apples that could effectively be used by the Soviets to jam Radio Free Europe. Gold plated RCA to RCA patch cords (Radio Shack MF-200) do the trick in this noisy environment. They might also do the trick for you.

Another trick is bypassing the switchbox, if you don't mind the inconvenience of removing the box entirely and attaching the ends of the video cable directly to the TV antenna terminals when it is time for the *A-Team*. Sometimes the little box itself is to blame for substandard reception.

And so that is the last word (we hope) of Commodore's Port concerning C-64 quality control. We are heartened that things are on the upswing; now we can concentrate on the fun stuff. In its latest incarnation, the C-64 is finally a machine you can unabashedly believe in. Now if only we could get it to scroll more smoothly . . .

Driving The Wedge

If you have a disk drive and are not using a wedge program with your Vic-20 or C-64, you are missing out on a great convenience. The wedge is supplied with all new 1541 drives, and registered owners of C-64s and older drives should have received it on a free *Disk Bonus Pack* sent to them by Commodore. If you qualify but have not received a *Disk Bonus Pack*, write to Commodore at 1200 Wilson Dr., West Chester, PA 19380. Make sure you state the machine serial numbers of your C-64 and drive.

Loading the wedge as it appears on the demo disk accompanying new 1541s is as simple as typing LOAD "VIC-20 WEDGE",8, or LOAD "C-64 WEDGE",8, then RUN. For the wedge on the bonus pack, type LOAD" DOS WEDGE",8,1. When the machine comes back with a READY, type SYS 52224, and the wedge header should come up on the screen. Don't forget the leading space in the file name, or you will get a true FILE NOT FOUND error.

Once the wedge is loaded, disk I/O commands are much easier to invoke (a full list of wedge commands appears as Figure 1). No longer must you memorize cryptic command codes to load, save, scratch, or rename files, or to format disks. Using the wedge you may call up a disk directory without clearing the current program from memory. You can query the disk error channel with a single typestroke. You can even load and run files in a single step.

So remember, the trick to mastering the Commodore course is to use the right clubs. You wouldn't want to use a putter off the tee, right? C-64 Wedge is the one to use to get your files out of traps and onto the greens of Commodore computing.

```
COMMAND                          FUNCTION
----------------------------------------------------------------
↑[FILENAME]                      LOAD, THEN RUN, [FILENAME]
←[FILENAME]                      SAVE [FILENAME]
/[FILENAME]                      LOAD [FILENAME]
%[FILENAME]                      LOAD [FILENAME] AT ADDRESS
@                                QUERY DISK ERROR CHANNEL
@$                               LIST DIRECTORY
@S:[FILENAME]                    SCRATCH [FILENAME]
@I                               INITIALIZE DRIVE
@UI                              RESET DOS
@N:[DISKNAME],[ID]               FORMAT DISK [DISKNAME],[ID]
@C:[NEWFILE]=[OLDFILE]           RENAME [OLDFILE] TO NAME [NEWFILE]
@Q                               QUIT DOS WEDGE
```

Figure 1.

C-64 Logo

After a rather lengthy wait, the Logo programming language has finally appeared for the C-64, and it is a strong implementation. Written for Commodore by the Terrapin group at MIT, it is full-fledged in every respect, including sprite graphics and music commands. As a language for the manipulation of graphics and sound, as well as a language for the beginning programmer, C-64 Logo is without peer.

Just what is Logo, you ask? Logo is a structured programming language, miles ahead of Basic in its simplicity and elegance. It is an especially attractive language for the learner. It is much more logical and English-like to use than virtually any other language available for microcomputers (dyed-in-the-wool Pascal chauvinists may disagree). Like Pascal, it is procedure-oriented—that is to say that all subroutines are named and may be invoked simply by defining them as procedures, then "calling" them by name.

Logo programs have no line numbers: they are simply nested procedures. Hence Logo qualifies as a "structured" language. Logo programs are not hodgepodge routines grafted onto incremental line numbers fraught with GOTOs and GOSUBs. They do not require the kind of detective work a Basic programmer takes for granted, hunting first here, then there, and eventually everywhere to follow the thread of a program. As a direct result, Logo programs are much easier to analyze than are programs in Basic or its big brother Fortran.

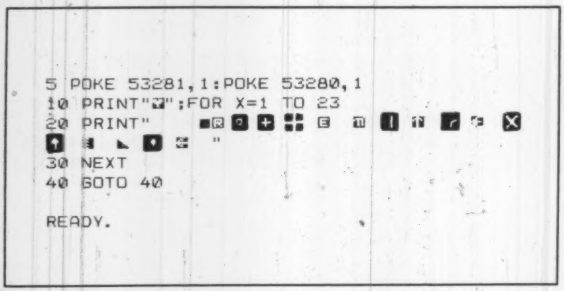
To create a Logo procedure, you use the Logo editor. This allows you to move through a procedure or subprocedure and make all the additions, deletions, and changes you want. If you make changes and then decide to unmake them, that is possible too, using the command CTRL-G.

Animated dinosaurs feed in C-64 Logo, in only a few lines of code.

Debugging programs in C-64 Logo is even easier than in other dialects of the language. Besides requiring you to debug only specific procedures which are flaky, as opposed to whole reams of code, C-64 Logo includes a restartable interrupt procedure, which is the equivalent of adding a break key to the C-64. In addition there is a trace function, which allows you to watch the execution of a procedure line by line.

You may have heard about turtle graphics, which is a powerful part of Logo that children especially seem to like. Well C-64 has a full implementation of turtle graphics, in all its glory. Even beginning readers can create sophisticated graphics displays using turtle graphics. They afford instant programming gratification and have fired the ambitions of even six-year-old programmers.

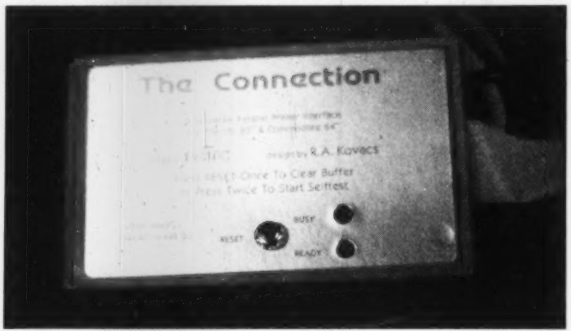
The Logo disk itself is accompanied by a utilities disk, chock-full of demonstrations and useful procedures to help get you started. These include



```
5 POKE 53281,1:POKE 53280,1
10 PRINT"";FOR X=1 TO 23
20 PRINT"
                    "
30 NEXT
40 GOTO 40

READY.
```

Figure 2. Test pattern program shows special graphics characters rendered on the Oki 92 via the Tymac Connection. Hand-drawn characters were dropped.



The Connection, from Tymac.

graphics and sound demos, geometric, trig, and log procedures, a Logo sprite editor, and dozens of other helpful programs.

As for the documentation, I cannot say enough. It is excellent, as one might expect from the Logo group at MIT. It runs for nearly 400 pages, and is strongly indexed. My only picky complaint is that the manual is perfect bound, and short of breaking its spine, it is tough to keep it open to the desired spot. Still, Commodore Logo has been worth the wait. I highly recommend it to all C-64 owners interested in tapping the potential of their machines.

The Centronics Connection

Before you buy a Commodore printer for your Vic or C-64, consider the advantage of connecting *any* Centronics parallel printer to your system. The proven quality of an Epson, Mannesmann, or Oki printer might be more attractive than that offered by Commodore printers themselves. And with products like the Connection, from Tymac Controls, you can make your FX-80 behave just like a Commodore 1525—even down to the special graphics characters.

One end of the Connection interface plugs into the daisychain serial connector of the computer or disk drive, the other into the Centronics connector on the printer. It can be assigned any device number and will provide virtually total emulation of Commodore printers. It supports all standard commands, such as OPEN, PRINT #, and CLOSE, tabbing, adjustable left and right margins, graphic repeat, and dot-addressable graphics. The Connection also provides features that a Commodore printer does not: it includes a 2K buffer, printer self-test, LED status indicators, reset switch, skip over perforation mode, and programmable line length.

Special ROM versions of the Connection are available for all popular printers; it is important to buy only the version for your machine so graphics will print out correctly. We have the interface for the Okidata 92, and it has performed flawlessly. Its renditions of special Commodore graphics characters are even more legible than those output by the Commodore 1525. Margins can be set to make listings match screen width. And if you wish, English tags can be substituted for special graphics characters.

C-64 owners should know that the Connection will print out only those graphics characters shared by the Vic-20–this means that graphics characters for the second bank of eight colors *cannot* be printed (see Figure 2). This condition is shared by the Commodore 1515 and 1525 printers.

The Connection lists for $120, but has been heavily discounted. Tymac also offers interfaces without special graphics drivers for under $30. For more information, contact Micro-ware Distributing, P.O. Box 113, Pompton Plains, NJ 07444.

Well, that about wraps it up for the first Commodore's Port of 1984. Next time we shall look at a screen save technique for C-64 character graphics. Until then, may all your drives be straight down the Commodore fairway. Catch you next time. END

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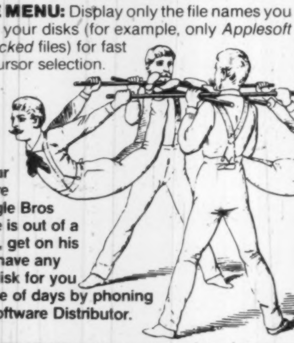

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```
10 LIST: LIST: LIST: FOR ZZ=PEEK(175)+PEEK
   (176)*256+36 TO 3072: POKE ZZ,216: NEXT
20 FOR XXX=1 TO 2: POKE-16299,0: POKE
   -16300,0: XXX=1: NEXT: REM Experiment
   with different length variable names.
```

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LIST FORMATTER prints each program statement on a new line. Loops indented with printer Page Breaks. A great Applesoft program de-bugger.

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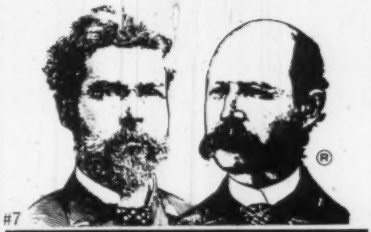
COMPRESS HI-RES DATA to 1/3 disk space (average) allowing more hi-res pictures per disk.

MANIPULATE IMAGES: Superimpose any two images, or RE-LOCATE any rectangular section of any drawing anywhere on either hi-res page.

HI-RES TYPE: Add text to your pictures with adjustable character-size and large-character color. Type *anywhere* with no Htab/Vtab limits. Type sideways too, for graphs. Includes Tip Book #4.



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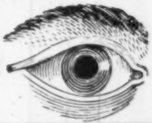
Requires Apple IIe (OR II/II+ with RAM Card).

RENAME ANY APPLESOFT COMMAND or Error Message to anything you want. For program clarification, encryption/protection or even foreign translation. Plus add optional powerful NEW COMMANDS:

ELSE follows If-Then statements, like this:
IF X=2 THEN PRINT "YES": *ELSE* PRINT "NO"

HSCRN reads color of any hi-res dot for collision testing. **SWAP X,Y** exchanges 2 variables' values. New **TONE** command writes music with no messy pokes & calls. **SCRL** scrolls text in *either* direction. **TXT2** lets Text Page 2 act exactly like Page 1.

PLUS: GOTO & GOSUB may precede variables, as in "GOSUB FIX" or "GOTO 4+X". Escape-mode indicated by special ESC CURSOR. Replace awkward Graphics screen-switch pokes with 1-word commands. Change ctrl-G Beep to any tone. **INVERSE REMS** too! All GPLE compatible.



```
1 FOR S=768 TO 773: READ A:
  POKE S,A: NEXT: POKE 232,0:
  POKE 233,3: DATA 1,0,4,0,5,0
2 HGR2: FOR R=0 TO 192: ROT=R:
  SCALE=96: XDRAW 1 AT 140,95:
  SCALE=30: XDRAW 1 AT 140,95:
  S=PEEK(49200): NEXT: RUN
```

PRONTO-DOS

HIGH-SPEED DOS / DOS-MOVE UTILITY

by TOM WEISHAAR

$29.50: Includes Peeks & Pokes Chart

TRIPLES THE SPEED of disk access and frees 10,000 bytes of extra memory by moving DOS.

Function	Normal	Pronto
BLOAD HI-RES IMAGE	10 sec.	3 sec.
LOAD 60-SECTOR PROGRAM	16 sec.	4 sec.
SAVE 60-SECTOR PROGRAM	24 sec.	9 sec.
BLOAD LANGUAGE CARD	13 sec.	4 sec.
(Text Files: No Change)		

Boot the Pronto disk or your updated disks, created with the normal INIT command. Compatible with all DOS Commands, GPLE, Double-Take, DOS Boss, Diskquik and almost all unprotected programs.

MOVE DOS to your Language Card; RAM Card, or standard Apple IIe upper 16K, freeing up **10,000 EXTRA BYTES** of memory for your programs.

15 EXTRA SECTORS per disk. Catalog Free-Space displayed every time you catalog a disk.

TYPE-COMMAND ("TYPE filename") prints contents of any Text File on screen or printer.

DISKQUIK

DISK DRIVE EMULATOR

by HARRY BRUCE and GENE HITE

$29.50: Includes Peeks & Pokes Chart
Requires Apple IIe with Extended 80-column Card.

ACTS LIKE A DISK DRIVE in Slot 3, but much faster, quieter, more reliable and $350 cheaper. Enjoy the benefits of a 2nd (or 3rd or 4th...) drive at less than 1/10th the price. Catalogs normally with "CATALOG, S3" command. Load & Save any kind of files into RAM with normal DOS commands.

SILENT AND FAST: Since no moving parts are involved, Diskquik operates silently and at super-high speeds. See it to believe it. Your Apple IIe's Extended 80-column Card (required) can hold about half the amount of data as a 5¼" floppy disk!

MANY USES: For example, load often-used files, like FID and other utilities, into RAM when you boot up, so they are always available when you need them. Copy files from RAM onto disk and vice versa, just as if a disk drive were connected to slot #3.

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CROSS-REFERENCE: Sorts and displays line numbers where each variable & string appears.

BETTER RENUMBER/APPEND: Merges programs (doesn't just connect end-to-end).

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AD#7

CIRCLE 116 ON READER SERVICE CARD

Logo Type

Soccer, Anyone?

LOGO
SPOKEN HERE

Donna Bearden

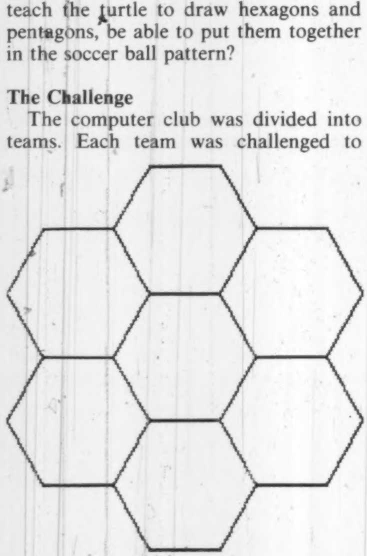
It seems as if everyone has been bitten by the soccer bug, even the Logo turtle!

It all started with a fourth grade boy from Venezuela who lives and breathes soccer. He is in the United States temporarily while his dad goes to school at the University of Dallas. Carlos belongs to the computer club at Forrest Park elementary school in Irving, TX.

Looking for a way to combine his love for soccer with his involvement with a computer, we began looking at soccer balls instead of just kicking them. What we discovered was an intriguing pattern of pentagons and hexagons. Would the students, who had already learned to teach the turtle to draw hexagons and pentagons, be able to put them together in the soccer ball pattern?

The Challenge

The computer club was divided into teams. Each team was challenged to teach the turtle to draw the pattern of a pentagon surrounded by five hexagons—not as easy a task as it first seems.



Donna Bearden, Young Peoples' Logo Association, 1208 Hillsdale Dr., Richardson, TX 75081.

One team defined a procedure for a pentagon and another for a hexagon and then started trying to figure out how to put them together. The other team figured they could define a hexagon, then make a ring of hexagons, and end up with a pentagon in the center. After all, that is the way it looks on the ball.

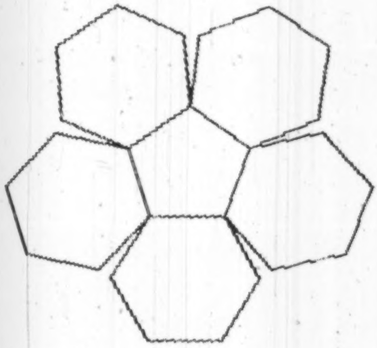
Their looks of triumph quickly changed to puzzled ones when they realized the ring of hexagons had, of all things, a hexagon in the center.

How could that possibly be when they could look at the soccer ball and see a ring of hexagons with a pentagon in the center? Something very strange was going on. The difference, of course, was that the soccer ball was a three-dimensional object that they were attempting to draw in two dimensions.

The first week ended in a tie—0 to 0, with everyone puzzled but not discouraged. They knew there must be a way to do it and were eager to try again.

The second week we brought an old soccer ball with us. It had long since seen its last game, but we gave it a chance to score one more goal. By cutting it apart, the kids could see how the pattern had to be split to enable it to lie flat. (If you don't have an old soccer ball, try using the peel of an orange or grapefruit.)

Once they saw the splits that allowed the curve of the ball to flatten out on the table, they returned to the computers more determined than ever. Most of them had to leave at the end of the hour, but Carrie Simms, a fourth grader, stayed long after everyone else had left and figured out one way to draw the pattern. Here is her solution:



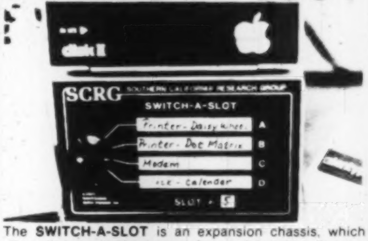
```
  TO PENT
  REPEAT 5 [FD 20 RT 72]
  END

  TO HEX
  REPEAT 6[FD 20 RT 60]
  END

  TO SOCCER
  PENT
  LT 120
  HEX
  REPEAT 4[LT 132 FD 20 RT 60
HEX]
  END
```

The Teachers Try

At the Microcomputers in Education Conference at Arizona State University in March, we presented the soccer ball

SCRG — For Apple][, Apple][+, & Apple //e

SWITCH-A-SLOT



The **SWITCH-A-SLOT** is an expansion chassis, which allows the user to plug in up to four peripheral cards at one time. One of these cards is selected for use, and only that card draws power.

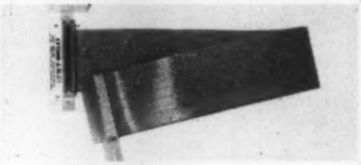
This product is especially useful where the software requires the printer to be in a particular slot, and the user wishes to choose between two or more printers.

- Allows up to four peripheral cards to be plugged into one peripheral slot.
- User selects desired card by front panel rotary switch.
- Only selected card draws power.
- Plugs into any peripheral slot.
- Saves wear and tear on delicate connectors.
- 18" cable connects Switch-a-slot to computer.
- Accommodates cards up to 10¼" long.
- All connectors gold plated.

$179.50

SWITCH-A-SLOT and EXTEND-A-SLOT work well with all slow to medium speed cards, such as Modems, Printers, Clock, 80 Column, Music, etc. They are not recommended for high speed data transfer devices such as disk drive controllers, alternate processor, and memory cards.

EXTEND-A-SLOT



The **EXTEND-A-SLOT** brings a slot outside your APPLE™, allowing an easy change of cards. The 18" flex cable is long enough to allow placement of the card in a convenient location. The high quality connectors are gold plated for reliability.

The perfect accessory for:

Owners of large numbers of I/O expansion cards—keep your frequently used cards installed. Use the EXTEND-A-SLOT for the others.

Technicians—easy access to test points on accessory cards under actual operating conditions.

Experimenters—make easy changes to cards while card is installed.

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NEW PRODUCTS

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FEATURES:

- Up to 128K of memory
- Supports 2716, 2732, 2764, & 27128. These types may be freely intermixed
- **QUIK LOADER** operating system allows instant loading of programs, **PROM** catalog routines, etc.
- Multiple cards supported.
- Slot independent

Requires APPLE //e, or][+ and 16K card with minor modifications.

$179.50

D MAnual controller

This hardware product gives the user complete control over all I/O functions in the range $C000 through $C0FF.

Examples:

- Switch between TEXT & GRAPHICS
- Switch between Page 1 & Page 2
- Switch between HI-RES & LO-RES
- Turn disk drive ON or OFF
- Select between drives 1 and 2
- Step head in either direction
- Protect or enable language card
- Turn annunciators ON or OFF

DMAnual controller allows all this while programs are running. Commands can be issued (via push-buttons) in the middle of a program, and the desired result occurs immediatly. The process used (known as CYCLE STEALING) allows immediate execution of these commands without interfering with the normal operation of the program. The card is slot independent, and is connected to a control panel by a four foot cable. **DMA**nual controller is fully described in the book "UNDERSTANDING THE APPLE][" by Jim Sather (copyright 1983 by Quality Software).

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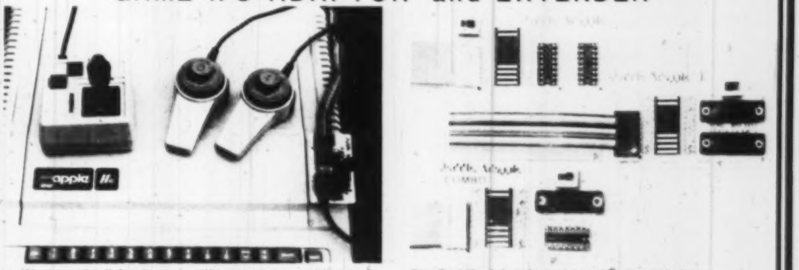
Paddle-Adapple

GAME I/O ADAPTOR and EXTENDER



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The **Paddle-Adapple** has two 16 pin sockets.

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CIRCLE 245 ON READER SERVICE CARD

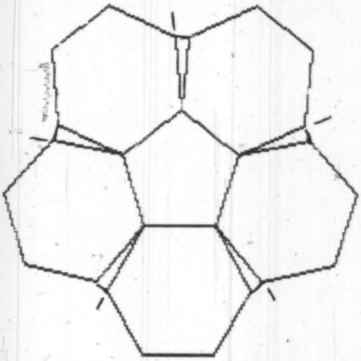
Logo Type, continued...

puzzle to a group of teachers, most of whom were first time Logo users. Most of the adults were as puzzled but as determined as the students had been. John Onacki, an Arizona math teacher, came up with this solution almost by accident:

```
   TO DESIGN :R :D
   REPEAT 5[POLY :R :D FD :D LT
72]
   END
   TO POLY :R :D
   REPEAT :R[FD :D RT 360/ :R]
   END
```

By giving the command DESIGN with an input of 6 for :R and any number for :D, you create the soccer ball pattern.

Once the kids in the computer club were able to draw the pattern on the screen, we decided to take the two-dimensional drawing and turn it back into a three-dimensional soccer ball. Because there are 12 pentagons on a soccer ball, we printed out 12 copies of the pattern. The "players" then cut out each pattern. Rather than cut out the long, narrow triangle between each hexagon, they cut only one side of the triangle and brought the sides of the two hexagons together, securing them with tape.



They could then experience the curve of the ball beginning to take place. By overlapping the 12 pieces of the ball, they taped together one fantastic paper soccer ball. They had completed the circle, going from three dimensions to two dimensions and back to three.

But that wasn't the end. It had started as a cultural experience and through some creative imagination, ended as quite another. Just before we taped the last piece of the ball in place, one of the kids said, "Hey, let's fill it with candy and turn it into a piñata!" And that is exactly what we did. END

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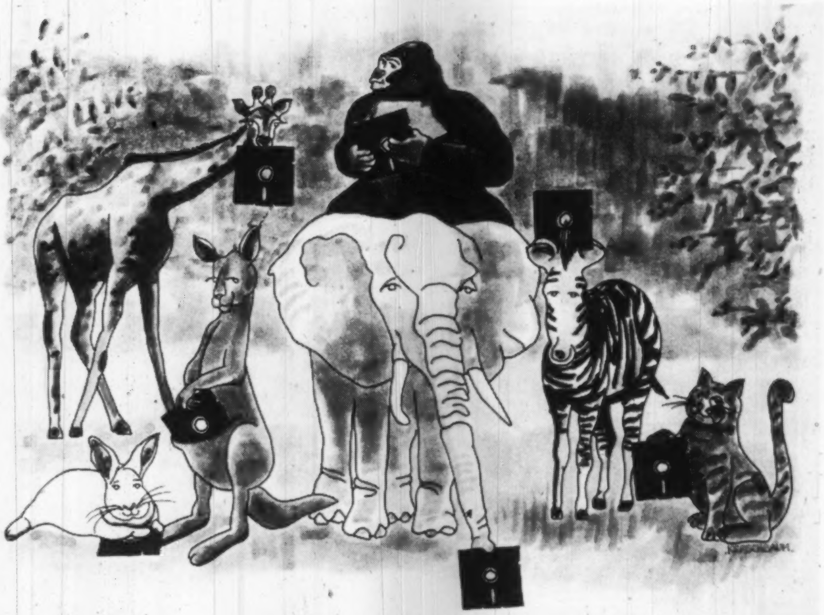

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CIRCLE 115 ON READER SERVICE CARD

The Cultured Computer

Robert E. Mueller

This is the first of a series of articles by Robert Mueller. Bob will write about creative and cultural aspects of computers, if your reactions are favorable. Feedback is solicited.

Bob considers himself to be primarily a visual artist. He does both abstract oils and drawings, and also socially-oriented woodcuts. Nevertheless his background spans science and all of the other arts. He has a degree in Electrical Engineering from M.I.T., and another in Philosophy from New York University.

What is the first step in culturing computers? To speak of culturing computers may seem extravagant. Everyone knows they are just overblown calculators. Computers may be growing increasingly complicated, but where do we get off saying they have anything to do with culture? What is *culture* anyway? Does it relate to our art? Our science and industry? Our political institutions? Our amusements? Do the games we play define our culture? Perhaps all of these—and more.

Let's concentrate on games. Video games. These new ways for humans to play are certainly unique to our society. They represent a way to transform the most formidable and complicated powers of computers, barely understood by highly trained specialists, into something everyone can enjoy: computational power transformed into human tools of skill; mathematics into method—immediately understood because it is made visual. Video games have emerged as the pop of computer software. Although there are few well known pop stars in the computer world, there are certainly millionaires.

When you play a video game you develop a unique symbiosis with a machine. The device is not only sensitive to your movements and commands but expands to embrace your passions and prides with its progressively complex logic. A video game does what you see, and sees what you do instantly, powerfully, in full color, and at the speed of immediate, real time.

This is what is so fascinating about a video game. Less fatiguing, it is still quicker than any other game we can play, and at the same time it is potentially more intellectually challenging.

America has a history of committing itself to solving all the problems of society.

It also leads to a hypnotic obsession, as we all know. Computers seem to have a way of obsessing people. Which of course is their danger: obsession to the point of blind dominance and obedience. Admitted negatives aside, however, let's try to analyze the positives.

Computers arose to help us solve problems in an increasingly problem-posing society. Like their mechanical relatives during the industrial revolution, computational tools began to be invented back in the eighteenth century when calculations began to exceed human abilities to do them. The data from logarithmic tables began to pile up so enormously that people like Babbage became impatient. Thus was begun the process that led to today's devices.

When this impulse reached America, a combination of Yankee ingenuity and plain laziness forced people like Herman Hollerith to build early punched-card systems. Americans are impatient, and speed in transportation and speed in communication quite naturally lead to speed in thought. America has a history of committing itself to solving all the problems of society. The computer is our latest attempt to grapple with the complexities of the modern age and reduce them to processes as simple as video games. (In fact, the elegance and clarity of video games is emulated by human factors and AI people designing human-machine interfaces for sophisticated computerized systems. It is very nice to paint your desires on a screen, or talk to a computer in English, and let the computer do the rest.)

When society ties itself into impossible knots and builds intricate mazes that confuse and paralyze human activity, inventors are impelled rat-like to find ways out of the dilemmas created. Complexity more than necessity is the parent of invention. The human being has a way of countering chaos with creativity. This creative impetus is a force that usually emphasizes humanity, but sometimes that urge does not glorify us. Splitting the atom is the most notorious example of how progress can backfire.

In the case of the computer, problems early became obvious. Automatic systems require less human help, and therefore they seem to be a threat to our employment system. But more important, automating intelligent human activities had the effect of demystifying intelligence itself. Less knowledge was required of humans to think things once considered mind-

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Cultured Computer, continued...

boggling. Anyone with a hand-held device could perform mental feats only savants could do before. The mathematical abilities of computers began to shift our admiration from people to devices—and, at the extreme, to robots, who could become our mental giants and our envied masters. In the end, however, I think that video games should humble computer designers, became they reduced very difficult problems to simple audio-visual-manual solutions.

Problem solving in general is fun. But automated problem solving is more fun. Who cares what kind of a technical device we use to solve our problems; if we can solve them quicker or easier, we are all the more pleased. Give us bigger and more difficult problems, and we will be even more pleased when we unravel them. This is part of the joys of education—call it intellectual gaming. We get deeper and deeper into labyrinths of difficulties, and by neatly tying pathways together, we simplify their complexities. Why not use this marvelous new tool, the computer, to help us simplify life? Can it even help with our art—and enrich our culture too?

The problem is that abstractions have a way of trapping us, of fooling us into believing we have solved some difficult problem. What does a game won, or a high score achieved, represent? We displace our difficulties and build solutions that we soon discover are not solutions at all. Oh, they solve those areas we set up—say a game whose maximum score we can finally reach, regardless how complex the rules or the boundaries we formulate to define it. But they answer nothing finally—which is what we wish they would do.

Mathematical difficulties worked out elegantly are sometimes so beautiful that we think they represent an absolute truth. This is the story of our intellectual life! Everything seems so simple—on paper.

> ***Video games are a good example of how fascinating total control over a little bit of experience can be.***

How far can we take this? If we remain dominated by games, will it help us in solving the meaning of existence?

Living life is difficult. One of the reasons we play is to escape disagreeable experiences (particularly poignant ones during puberty). Video games are a good example of how fascinating total control over a little bit of experience can be. If we surrender to the demands of a challenging game, we get a great feeling of mastery when we win (or reach a high score). A challenging problem solved or a game won gives us a powerful feeling of mastery. The overwhelming problems of living are concentrated in our hands, and with deft movements and a little mental or physical exertion, we can actually solve them (for a few minutes). Life makes momentary sense.

But in the end our accomplishments begin to take over. We define ourselves with our dynamic achievements. Can we stop ourselves from surrendering to these achievements and repeating them again and again? How long can a culture survive on repetition? We run our mile as fast as we can, nevertheless we run it again and again, hoping to beat our own record. Where does it end, this race to automate tedium?

Culturing society in a democracy means making the deepest and most creative human insights and perceptions available to everyone. We want to culture computers to improve our own culture through them. This is not a question of displacing humanity onto computers, as science fiction suggests. Rather, it means making computers available as insightful tools for sensitive, non-computer people to use to elevate the collective human condition. Although video games may seem a far cry from this noble pursuit, I think they may well be the first step.

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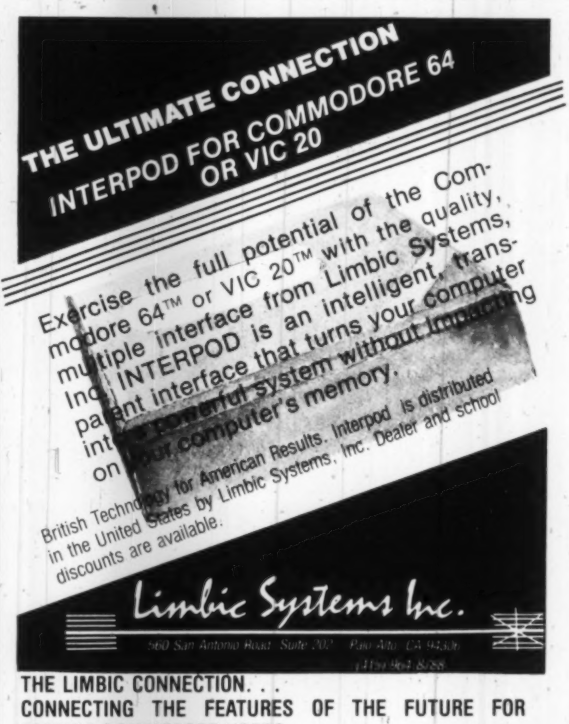

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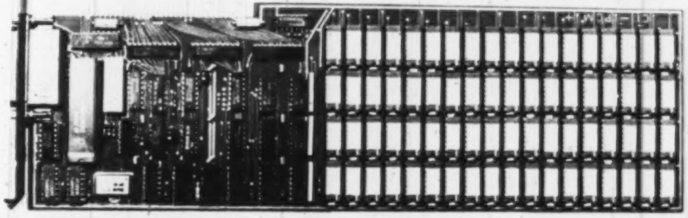

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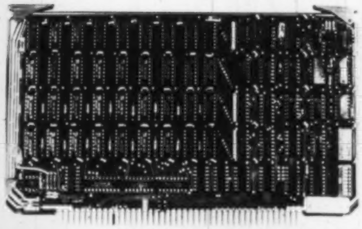

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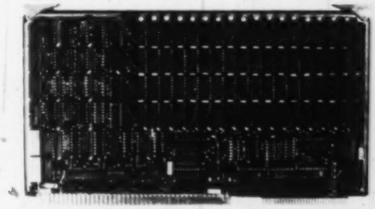

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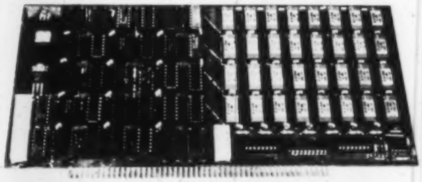

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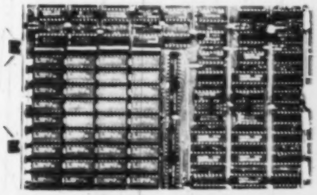

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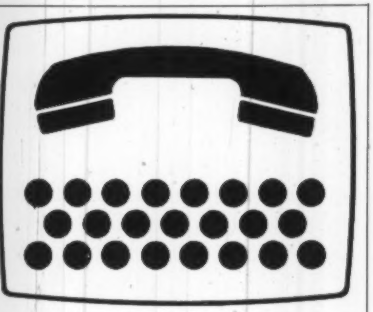

Telecommunications Talk

Brian J. Murphy

Welcome to Telecommunications Talk! This is the first in a series of columns on the subject of computers and telephones.

Topics will include information utilities, bulletin board systems, hardware, software, and the purposes to which you can apply your computer/modem system.

We invite your participation. Users, feel free to tell us about your BBS systems, communications programs, and anything else you have that is of interest. If it checks out, we will use it. Manufacturers, let us know about your software and hardware products for telecommunications. We can't promise to use everything you send, but much material we receive will find its way into the column.

The Great Computer Hack

Milwaukee: Land of "Happy Days." Richie Cunningham. Pottsy and Ralph. The Fonz. Neal Patrick and the 414s.

Neal Patrick and the 414s?

No, they are not a 50's rock group. In case you don't remember who Neal Patrick is, Sherman, let's set the Wayback Machine for August 1983. The place? Any front page of a newspaper will do: "Report 'Break In' Of Atom Lab Computer," "Cancer Clinic Computer Tampered With," "Trespass At Los Alamos Computer." How about the cover of Newsweek for September 5, 1983, with a picture of 414 "Hacker" Neal Patrick on the cover? Remember now?

The 414s were a very small group of high school age kids from Milwaukee who had met at an explorer post and found that they had a similar interest, telecomputing. Until the spring of '83, they had done nothing to merit national headlines or a Newsweek cover, but with a few log-ons all that changed.

The Break-Ins

To reconstruct events briefly, on August 11 it was revealed that one of the computers at the Los Alamos National Laboratory in New Mexico had been accessed by telephone by an unauthorized user sometime in late June.

Los Alamos, being the place where much of the nation's theoretical nuclear research is conducted, is understandably reluctant to provide too many details about what the unauthorized users may have been looking into. Perhaps "reluctant" isn't the word. "Absolutely refused to discuss," may be the phrase most descriptive of their attitude. Their terse announcement to the press simply stated that an intrusion had taken place, that whatever it was the user or users had accessed was not classified nor did it deal with personnel matters.

So if the data they accessed wasn't the instructions for building an H-bomb or Dr. Edward Teller's attendance record, what was it? "Can't comment" said a Los Alamos spokeswoman when we attempted to weasel it out of her. She did make it clear, however, that whatever it was, was considered worth the time of the FBI to investigate.

At New York's Memorial Sloan-Kettering Cancer Center, a few more details were forthcoming. Again, Telenet had been used to gain unauthorized access to the computer. This time the computer data files accessed related to the monitoring of radiation treatment for cancer patients all across the country.

Spokeswoman Nancy Czaja explained that the program accessed is a utility used by radiation therapists to double check the amounts of radiation given in cancer therapy. Since radiation doses must be measured with precision to prevent them from becoming ineffective or counterproductive, this is a bad data bank with which to be playing idle games.

While he was playing with the data, the hacker managed to crash the system.

The total downtime was only five minutes, but it was enough to attract the attention of Sloan-Kettering's computer manager, who investigated certain security programs within the system. His investigation pointed to an unauthorized access of the system. It is not clear whether this access—and crash—was responsible for a block of data relating to billing being deleted from the system. After the initial incident was detected, the computer was accessed without permission "several more times."

The Cancer Center has several computers, according to Ms. Czaja, but the one the hackers accessed was specially programmed to provide easy access by physicians to give them valuable assistance in planning radiation therapy. That is what it was doing on Telenet, and that is why it was so easy to break into.

Brian J. Murphy, 133 Post Rd., Fairfield, CT 06430

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How They Did It, Who They Are

So far as we know, Los Alamos and Sloan-Kettering were not deliberately picked for trespass by these teenagers. When you call Telenet, you type in a coded set of digits which, like a telephone number, connects you to a participating computer. A few numbers are in the public or semi-public domain (The Source and Delphi information utilities are examples); most are supposed to be strictly private. The trouble is that you can make a successful link with many of those numbers once you become proficient with the Telenet system.

Getting past the security program is another matter. If you recall the movie *War Games,* all you had to do to get into the Air Force's most secret NORAD computer was come up with a single word password. It turns out that there was more truth to that scene than we had thought because at least until the Los Alamos and Cancer Center incidents this past August, it was almost as easy to log onto some of the major institutional data processing systems around the country.

Mike Hobach is the system operator (*sysop* for short) of BBS-SUE, a bulletin board system in Milwaukee. He knows all the members of the 414 group and says that they found getting the passwords for the big systems was as easy as it appeared in *War Games.*

Hobach said that the boys discovered that in many, if not most, of the big systems they invaded, the "default passwords" were still operative (these are code words used by manufacturers and programmers to access computers while they are being installed and programmed). Some of the most commonly used default passwords like *system, service,* and *test/password* seemed to work fine for the 414s when they attempted to log on to Telenet computers at random.

Sloan-Kettering and Los Alamos were the hacks that grabbed the attention of the papers—and the FBI, but the damage done by the hackers was reportedly minimal. Part of the hacking tradition, however, is mischief-making, and there had been at least one incident reportedly connected to a 414 member, according to Hobach, that illustrates the potential for serious damage.

About one year before the headline-making incidents, Hobach says, one of the 414s was responsible for causing serious damage to data files stored on a computer belonging to the Milwaukee School of Engineering. The boy responsible was reported to be too young to prosecute under Wisconsin law (which specifically prohibits unauthorized access into computers), but the school went after the boy's parents who wound up paying around $3000 to compensate for the damage.

Despite this incident, the 414s are not malicious mischief-makers, according to Hobach who says the boys have been portrayed unfairly in the press—especially the local Milwaukee papers which have taken a stern editorial stand on their capers. In reality, Hobach said, the 414s are nice young men of above average intelligence who generally do well in school and who really know what they are doing when it comes to computers. Neal Patrick, who has been the group's point man with the media, even operates his own BBS system, to which I have logged on myself. (By the way, Patrick has not answered my message, as of this writing, to tell me his side of the 414 story.)

By logging on to sensitive data banks, the 414s caused the fertilizer to hit the ventilation system. In the press, they were portrayed as the sinister side of the computer revolution, but this is probably an unfair characterization if the testimony of other computer users in their home town is reliable. Except for some unsubstantiated details I ran across in communicating with various sources in Milwaukee, the 414s seem to enjoy a reputation among other computerists as nice kids.

Computer Ethics

The defense of those boys, at least by their fellow computerists, goes beyond the disclaimer that they didn't mean to hurt anything or anyone. It goes to the point where the claim is made that there is nothing wrong with inspecting, without invitation, the programs and data files on a private computer system.

One defender of the 414s said to me, summing up the arguments in favor of hacking, "If this information is so confidential or so private, why is it accessible via Telenet? Why don't the system managers change the default passwords?"

DIRECT - CONNECT

In the atmosphere of the bulletin board systems, where there is a free interchange of ideas, programs, and data, and where most of the users are relatively young, it sometimes seems as though the world of computers was meant to have no walls, only doors waiting to be opened. Unfortunately, this isn't so. There are some thresholds which, though not illegal to cross, are unethical to pass.

One cannot pass judgment on the 414s or an anyone else who hacks so far as their responsibility before the law is concerned. In most states and nationally, hacking is apparently not a crime, except where it violates the laws relating to national security. That means that it is not OK to look at the computers at NORAD or Los Alamos even if it were as simple as dialing the right number and answering the password prompt with Joshua.

This is not a problem of legality but of ethics. Some readers of this column, who enjoy their hacking, may find the following points tiresomely familiar, but they are, I think, worth repeating.

- Computer trespass is a violation of privacy. Very simply stated, just because the information is on a computer and because the computer is accessible by telephone does not mean that anyone has a right to use that computer without permission.

Take the Sloan-Kettering case as an example. All patient data are, by ancient and honorable tradition, privileged information. Of course, there is no evidence to indicate that the 414s were deliberately trying to connect with the Cancer Center in the first place, but once they had, they had violated the rights of physicians and of cancer patients.

The range of information stored in computer data files which private individuals and institutions prefer to keep private is wide. It includes their financial status, health history, and employment records. This information may seem harmless, but most people would be embarrassed to learn that their private lives have been scrutinized by strangers. Put yourself in their shoes. Would you want all your secrets accessible to anyone with a computer and a modem?

The argument has been made that if it is easy to access a computer, then it is OK to log on. But if the door to an office building or a private house were to be left open I am sure that most people would resist their curiosity and not walk in to examine files and personal papers,

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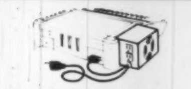

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to go through wallets, pocketbooks, and strongboxes. This is not what nice people do. When you trespass in a computer system, that is exactly what you are doing, and it is wrong.

I have heard the assertion that all computers should be open to all people at all times. This is a wonderfully idealistic way of looking at computers, but it is not a theory that works in the real world.

Computers are made for whatever purposes their owners see fit. If a computer owner chooses to exclude all but authorized users from the system, that is fully within his rights, as it is within yours to decide who uses your system. Unrestricted access to all computers all the time is simply unrealistic.

- By accessing systems with which you are not familiar, you risk damage to other people's property. This should be clear enough after the inadvertent damage to financial records and the accidental crash of the Sloan-Kettering computer. It is certainly evident if the reports of $3000 in damage to the computer at the Milwaukee School of Engineering are valid.

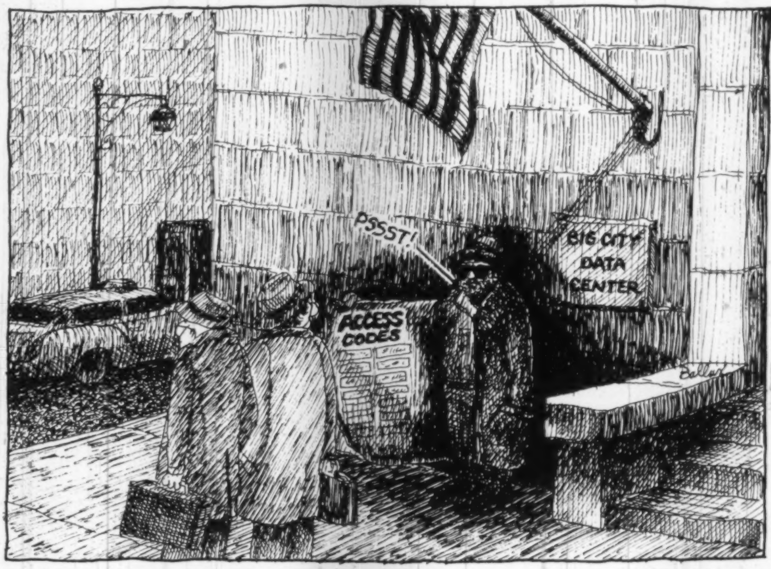
No matter how much experience with computers you have, you will blunder from time to time and either lose data, hang up a program, or crash the computer. Even with easy to operate home computers, errors are easy to commit. It is much simpler on big systems, with which you have had limited experience and with software with which you are not familiar to do serious damage to the software and data files on the system you are hacking.

So what? Well, it is not nice to anonymously intrude into a private system and bomb data. In the case of computers handling files of financial data, there is a potential for serious expensive damage. The case of Sloan-Kettering demonstrates how hacking can actually harm the vital interests of some people.

You can also do harm to yourself. Although most companies and institutions with the big mainframe systems can probably afford to undo any damage that a hacker causes, they don't have to absorb the financial burden alone.

The fact is that when you violate a private system, you risk legal action to recover the cost of the damage to the system, the manhours required to restore data, and so forth. If the company can prove that the damage was willful, they can sue you and soak you for substantial damages.

- Unauthorized access amounts to stealing from the computer owner. It is one thing to call the number of a system which invites the public, for free or for a fee, to use its data processing capabilities. When you access a system without that permission, you are taking the service from the owner of the computer without paying for the time and without paying for the wear and tear to which you subject the system.



Even big systems have breakdowns; actually they have more breakdowns than home computers. A big system will often have dozens of terminals and drives which are subjected to hellacious wear and tear. This is one of the reasons mainframe time is so expensive.

The bottom line is that it costs the mainframe operator much more to run his system than it costs you or me to run ours. The mainframe operator has a right to know and control who is using his equipment and to be compensated for its use.

A Bad Public Image

Aside from these ethical considerations there are the possible consequences of unrestricted computer trespass on telecommunications in general. Let's face it, the exploits of the 414s have given a black eye to the entire world of personal computing. As if there weren't enough concern that teens and young adults are "wasting their time" playing games on personal computers, now must combat the image of the teenage computer vandal. It is an unfair characterization of the vast, overwhelming majority of people under 21 who use home computers, but it is the sort of image that might just stick if we are all not careful.

Remember that we are at the mercy of the Federal Communications Commission, which regulates the phone lines, and the Congress and the state legislatures, which pass laws on how they may be used. Let's not create the kind of political pressure that would prompt any of these bodies to restrict our access to the phone lines.

We are also at the mercy of the multiple offspring of Ma Bell. It is quite well known among members of the telecomputing community that many local phone systems are thinking about levying extra charges for the use of modems on the public phone lines. If the image of telecomputerists is not one of responsible people but of pranksters irresponsibly using their computer/phone link to invade other people's privacy and damage their property, you can count on zero public and political support for keeping rates low.

Summing Up

I have probably said many things you didn't feel like reading, but I have seen too many good people and good causes unfairly and permanently smeared by people who were too ignorant and afraid to know what they were talking about.

Let's face it; there is a great deal of computer ignorance and computer fear out there. Let's not do anything that will make our hobby less prestigious or harder to pursue.

One final disclaimer. I have found that when the term "hackers" is used among telcomputerists, it refers not only to people who hunt at random for computers to access but also to people involved in a wide range of computer related activities. This latter group has done nothing wrong, and it would be unfair to suggest that they have. END

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CIRCLE 131 ON READER SERVICE CARD

Survey results, hiding a program, and a conversation with Wozniak.

Apple Cart

Stephen Arrants

1984 marks the tenth year of *Creative Computing*, the *first* magazine devoted to personal computers. January 3 is a special date to Apple owners. On that date in 1977, Apple Computer incorporated. Joseph Wiezenbaum, the father of Eliza and a pioneer in the field of artificial-intelligence was born on the 8th.

This month: survey results, some more on telecommunications, a long promised (but not forgotten) utility, answers, and a look at new things from Apple.

The Survey

Well, I finally completed reading all the surveys. Over 200 were received and stragglers trickle in each day. So, out of 208 respondents, who are you?

132 are men, 76 are women. The youngest is 12, but she says she "hopes to do better next year." Our oldest is 63. The geographical spread was from all over the U.S., two from overseas, and 27 from Canada—nice to know the home folks read me!

The average system is an Apple II+ with a 16K language card, one drive, monochrome monitor (with an RF modulator to connect with a color TV), and a dot-matrix printer. Twenty-five of you own Franklins and six have an Apple IIe.

Favorite software? Everything from *Apple Writer* to *Zaxxon*. There was little consistency here, though *Apple Writer* and *Screen Writer II* were the most mentioned word processors.

The "refuse to boot" list is more interesting—*only two people answered this!* You do a great deal of research before buying software, relying on reviews and other users' opinions. One person had problems with a graphics package and her printer, since remedied. Another reader said he hated a very popular spreadsheet because "... after going through ten menus and answering 1000 questions, I forget what I'm doing!"

Only 56 use a bulletin board or other telecommunications service, though most plan to buy modems and join either The Source or CompuServe.

The most perplexing answers had to do with users' groups. Only *ten* readers belong to a group. The rest of you couldn't find one in your area or didn't think a users' group could help. If there isn't a group in your area, start one. A users' group can be your most important source of information and support. Chances are that someone in the group has dealt with a problem you might be having.

Not all program fixes or alterations are documented. Users' groups often have files of these, which are open to members. One national group I can recommend is A.P.P.L.E.—Apple Puget Sound Program Library Exchange. Membership includes a great Apple-only magazine, discounts on hardware and software, telephone help numbers, and access to information not available elsewhere. You don't have to live near Puget Sound to be a member. A.P.P.L.E. will help you start your own group, and they are about the friendliest people you'll meet. Pick up a copy of *Call A.P.P.L.E.* for more information.

The majority (98%) of you bought an Apple or Franklin because of what it can do. Graphics, availability of software, and experience on another Apple were the three main reasons cited. Many thought the best thing about an Apple is the flexibility and adaptability built into the system. Gary Mugsford of Bramalea, Ontario says the Apple can be built into the machine he wants. "[It is] the frame for my computer of the future."

Apple loses points on pricing, however. Other complaints were the slow Apple DOS, 40-column display, lack of numeric keypad, and terrible documentation.

Only four of you had serious problems, such as a broken key, a chip failure, or a disk drive that INITed disks at odd times. One reader complained that after having an AppleCare warranty for two years, he still doesn't know what it's used for. I wish my printer worked as well.

Most of you recognized *InvisiCalc* for what it was—a non-existent product. It is easy enough to make your own copy. First, get a blank disk. Carefully remove the disk from the sleeve. Throw the disk away, label the sleeve, and you've got *InvisiCalc*. It is the only error-free program I know of.

Some of you had questions for me, so I'll answer some of them here.

Jim DeAngelis: It is possible to have text on a lo-res or hi-res graphics screen—sort of. The most practical way of doing this is to write a character generator program to draw the letters and text symbols on the graphics screen. This can be time-consuming, however, and requires a great deal of patience. There are commercial programs that do this, and we published a program to do

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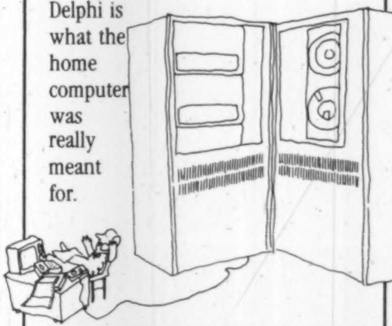

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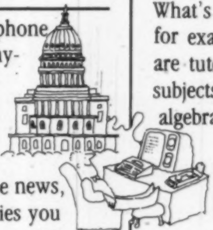

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CIRCLE 252 ON READER SERVICE CARD

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Apple Cart, continued...

this in *The Creative Apple* on page 27.

Jill Baroff: I suspect that your telecommunications problems are in your phone lines rather than in your Apple or Hayes 1200 modem. If you use a long distance service such as MCI or Sprint, the delay time from you, to a satellite, to the host computer can cause garbage on the lines. Try running at 300 baud. I encounter fewer errors at that speed.

Jerry Van Cleef: Yes, you are right! Those soft switches in the Apple IIe can cause many problems. I will list them for other readers:

$C050-$C057 display switches. $C055 is text page 2, $C050 is graphics (lo-res unless $C057 (hi-res) is selected.)

$C080-$C08F RAM and ROM bank select soft switches.

$C0E0-$C0EF are disk drive soft switches. Unless you know what you are doing, stay away from these softswitches. You won't cause any real harm, but you will have to reboot to recover. Thanks Jerry.

Terry Odgen: You can call your HELLO program anything you want. Just INIT with the program name, not HELLO. If you want a binary HELLO program, POKE 40514,52 before INITing. For a text HELLO program, POKE 40514,20. To have it do an automatic CATALOG, CALL 42350. This CALL works under DOS 3.3 even if the CATALOG command has been changed to another word. Try it with the drive door open. Normally you would get I/O ERROR if you CATALOG with the door open. With this CALL, the error message reads ROGRAM TOO LARGE. Why is the leading P left off? And why this error message? That's a good question. Does anyone have the answer?

Nancy Davidowicz: No, the Apple III is not dead. Apple is continuing support and development on this unjustly maligned machine.

I have been neglecting it in the column, but from time to time I will have information for Apple III users.

More Telecommunications

By the time you read this, *Creative Computing* will have a SIG (Special Interest Group) on the CompuServe Information Service. Our SIG will not charge any fees to users; all you pay for is connect time to CompuServe. We plan to feature the Street Price Index, Dateline: Tomorrow, and sections for downloading programs. We will select the best of past and current programs from *Creative Computing* and save you the time and trouble of typing in a listing.

There will be sections on program fixes, a section for readers to post their own program fixes and enhancements, a section for reader questions and answers, and previews of upcoming articles and evaluations.

From time to time we will have a live, user's meeting on the SIG so you can talk the editors and our guests. We hope you'll join us.

On another issue, local Bell System companies are filing petitions to charge modem users special access fees. Even if you use MCI or Sprint to access a host computer, these charges will affect you, since you access these carriers through local lines. The reasoning behind this is that those involved in computer telecommunication should pay a fair share of telephone rates. Now, there is nothing wrong with that. But the rates they propose are out of line for the majority of users. A business that is constantly transferring data over telephone lines should pay for more than average system use. But for you and me, these proposed rates are out of line. Bell doesn't want an extra two or three dollars per month. Most rates will add an average of *$30 per month* to your telephone bill. I urge you to let your local Public Utilities Commission or similar body know what you feel. Write your congressional representatives. Let them know what these rates will cost *you*.

News on Apple

On Sunday, October 16, 1983, Steve Wozniak, inventor of the Apple Computer (as if you needed to be reminded) was the guest speaker on CompuServe's Apple SIG. It was a great session. Steve answered questions from SIG members and the public on Apple past, present, and future. Steve gave those of us lucky enough to be present inside information about ProDOS, the Macintosh, new developments for the IIe and III, and his view of the industry.

On the Apple/Franklin case, Steve commented that when Franklin claimed "compatible," most people at Apple felt that compatible didn't mean *copy*. It was seen as another product for the market. When he saw the Ace, he felt that Franklin had copied the circuit and design, down to chip placement. "Programs belong to who wrote them, even the Op-Sys code and the like, and have value. You can't take another's work, 'Xerox' it and sell it. I found out it only takes two people to start a company, a Xerox operator and a lawyer!"

ProDOS should be out this month. It was written to support only 64K, since it was done a few years ago. But the enhanced IIe family is headed toward 16Mb in a short time with a revolutionary 6502-based processor. Steve hopes that the ProDOS source code will be available to users, but fears that the marketing department may feel protective of it. It will have easier access from assembly language, and will be the operating system shipped with future II's. DOS 3.3 will probably be available as a separate package at a cost of about $50.

The III will have better support. The III has a problem with development. Although it is a great product, it suffered, Steve believes, from poor first impressions. Apple didn't allow the hackers to do things in "their own random ways" on the III. Users should use a good product, like SOS, only if it is better for their application, not because a company forces it on them. "It's a good lesson to learn. The III is still difficult to learn how to do your own thing on. [It] will be remembered for years, even when problems (lack of software, hardware) are corrected."

What will the Macintosh be like? Steve says to look at a Lisa, then imagine it with less memory and hardware, but

Harry Stahl

able to work faster and better with fewer resources; a mouse, no color, no slots and "the finest software." It will use its own operating system which was developed to handle the user interface on Lisa more directly with better performance. Such good software had been written for Macintosh that it will be transferred to the Lisa. He doesn't see the Macintosh as initially replacing the IBM-PC as a small business machine because of memory, mass storage, and slot capability limits. It is intended to be a more finished product for the bulk of the personal market. Steve believes that the Macintosh is "the most revolutionary computer of all time—not that what it does hasn't been done before, but that it hasn't been done at a price which will wind up with millions experiencing it."

What about competition from the IBM "Peanut"? From the documentation, Steve thinks that it isn't the revolutionary price/performance product that has been promised. Until a large body of good software exists, "it's not the major home/education competition we were expecting. Remember what happened to Apple with the III—a great product got a bad start and the psychological effects of 'bad impressions' hung over us for years. The Peanut is a risky product—for example, if the disk drives have a bad reliability problem then the dealers will have a hell of a lot of non-technical computer purchasers expecting a hell of a lot from those three initials. [The Peanut] makes forthcoming Apple II products extremely good. I credit Peanut with a lot of the drop in Apple's stock price, but IIe sales worldwide are holding, and now rising."

Steve enjoyed the session, and may be back to host other meetings. If you are a CompuServe user, GO PCS-51 to join MAUG, the Micronet Apple Users Group. MAUG charges no fees, features a great download section, programming hints, and members can help you with almost any programming problem you might have. It is almost reason enough to join CompuServe.

Editing Basic Programs The Easy Way

Applesoft is a powerful language, but unfortunately it doesn't have a powerful text editor. How many times have you typed in a long listing and decided you needed to change a variable or string throughout the entire program? You could list each line, using the ESC sequence and type each correction. Slow. Dull. Discouraging.

It would be nice to use a word processor to edit a Basic program, but word processors usually use text files. Here is a way to change a Basic program into a text file, edit it, and change it back into a Basic program.

After entering your program, insert the program in Listing 1. RUN it to create a text file, and boot your word processor. Edit as you would a word processor file and SAVE the corrected text. Then go back to DOS and EXEC the file. EXECing puts the program into memory. List it to check for changes, and when you decide it is correct, SAVE it. That's it! Quick, simple, and almost bomb-proof.

How to Hide a Program

There are better ways to keep a program safe from prying eyes, but few are as simple as the following.

After the program is loaded, PEEK (2049), and make a note of the value. Now make the first line of your program POKE 2049, X. Where X is any number other than the PEEK value. RUN the program, break, and try listing it. What you see, depending on what you POKEd in, is garbage. Don't worry—your program is still safe and sound. To restore the listing, POKE in the value recorded. Ah—but what if the snoop decides to LIST before RUNning? Well, looking in Professor Luebbert's *What's Where in the Apple,* we see that decimal location 214 is the Applesoft Mystery Parameter. If you set it to $80 (decimal 128), by a POKE 214, 128; *any* command will cause the program to RUN. (The normal value for 214 is 0.) And if you POKE 1010,102: POKE 1011,213: POKE 1012,112; you make an attempt to RESET cause the program RUN. (These are the Autostart ROM reset vector and power mask. Normal values are 1010,191; 1011,157; and 1012,56.)

Those are just a few simple ways of protecting your program. If you know of any others, send them in to me at Creative Computing or by EMAIL at CompuServe account 75675, 1075.

Next month, how to read the names of deleted files when doing a CATALOG, and (I promise, Dr. Bill Ross) how to recover them intact. END

Listing 1.

```
0  POKE 33,33:D$ =  CHR$ (4): PRINT D$"OPEN FILE":
     PRINT D$"WRITE FILE": LIST
     1,63999: PRINT D$"CLOSE FILE": TEXT : END
```

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IBM Images

Susan Glinert-Cole

As 1983 fades away into a twisty little maze of memories, all alike, it is appropriate to present a few annual awards and make a resolution or two. I have thought long and hard about resolutions, but there is only one to which I feel I could honestly adhere: I resolve not to plant scurrilous messages in my boss's AUTOEXEC.BAT file. Seeing as how he said something about tearing my heart out should I attempt such a disreputable and unbecoming action, this is one resolution that will be scrupulously observed. Some people probably think nothing of an external cardiac peripheral, but my preference has always leaned towards an internal configuration.

The awards part came a little easier. This year, for the first time, I am proud to announce the (taa taa) Surly Software of the Year Award to...

(noises of tearing envelopes and rustling paper)

*** States and Caps ***
by
Alphanetics
for
insisting that Massachussetts is spelled:
MASSACHUSSETTES
and thereby preventing me
from winning the game.

The second award, made to computer magazines everywhere is... (rip, rustle)...

The Pleonastic Award
for
*** Articles on Patching WordStar ***

1983 is the year I have added a fourth to the World's Three Greatest Promises (only one of which—the check is in the mail—is mentioned here).

Number four is... (rustle, rustle)

*** The new documentation will be ready in two weeks! ***

Byte Twiddling On A Shoestring

I was recently called upon to write a press release for a product of mine called *SurlyCalc*. This admirable piece of software runs entirely in the red. We at SurlySoft don't believe that anyone who owns a home computer can show anything other than a huge deficit and so we try to force people to face reality by being open and honest about the whole thing.

It's not the big outlays that do the damage; the vast expenditures for word processors and spreadsheets have usually been carefully budgeted for. This is commonly done by subjecting the cat to cheaper rations and switching to brand X antacid tablets. What really liquidates the assets are the measly little purchases like disks, magic markers, and those convenient little utilities that cushion the slide down the razor blade of computer literacy.

The question is, how can a person live without a file recovery program? Or a disk volume name changer? Or a file unhider? Or a bagel slicer? I know I did it once, but those days, like the early orange crate decorating phase of the college years, are gone forever. However, everyone running MS-DOS can do these things without buying a single extra disk from those nefarious software developers interested in separating you from your extra cash (and starving your pets in the bargain). This wonderful (and cost-effective) program is DEBUG.

Most people don't appreciate DEBUG, because it tends to be a bit cryptic in implementation, and appears to be only of interest to assembly language programmers and hexadecimal chauvinists. With a little study, and the tutorial provided below, some of the finer aspects of DEBUG can be appreciated by anyone interested in experimenting.

Among other things, DEBUG can be used to unerase a file, change the file attribute (hidden, system, or visible), and add or change a volume label. I have found that with a little practice, DEBUG is easier to use than an assortment of utilities, if only because it is small and is usually hanging around on my system disk.

The two things that are required for this exploratory exercise are the DOS manual and a disk that has been formatted with the system on it via the FORMAT/S command. This puts two hidden files, IBMBIO.COM and IBMDOS.COM, and one visible file, COMMAND.COM, on the disk.

DEBUG has the nice feature of being able to load absolute disk sectors. With a little disk anatomy lesson, then, it will be easy to follow the rationale behind the rest of the discussion. To avoid constant qualification, I will always be referring, in this article, to a double sided, double

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density rust-coated 5 1/4" frisbee with nine sectors per track, that is, the standard DOS 2.0 format.

The standard drawing of a disk shows a series of concentric circles, called tracks, divided into segments, called sectors. The standard IBM disk contains 40 such tracks per side, each divided into eight or nine sectors, depending on the version of DOS you are using or the instructions you give to FORMAT. If a disk is double-sided, with 40 tracks per side of nine sectors each, the total number of sectors on the disk is 720. Because each sector can contain 512 bytes of data, the total storage on this disk is 368,640 bytes.

Tracks are numbered consecutively, beginning with the outermost edge, from 0 to 39. Sectors are numbered from 0 to 719 for some applications, or by referencing the Xth sector of the Yth track. DEBUG prefers the former numbering system.

The first sector on a formatted system disk always contains the boot record. The next four sectors contain two consecutive copies of the file allocation table (two sectors per copy). The seven sectors that follow are allotted to the disk directory. Space is allocated for file data by clusters; a cluster is always one or more sectors. Double sided disks have two sectors per cluster and single sided disks have one. Clusters are allocated on a disk to minimize disk drive head movement; all of the sectors on one track are used before space on the next track is allocated. This is done by using the sectors on the first side of the disk, followed by the sectors on the second side. Figure 1 illustrates this numbering sequence.

```
absolute sector # 0  1  2  3  4  5  6  7  8  9  10  11  12  13  14  15  16 17 18
side              0  0  0  0  0  0  0  0  0  1  1   1   1   1   1   1   1  1  0
track             0  0  0  0  0  0  0  0  0  0  0   0   0   0   0   0   0  0  1
sector            1  2  3  4  5  6  7  8  9  1  2   3   4   5   6   7   8  9  1
```

Figure 1. Track, sector and cluster numbering schemes.

```
-D 0A00
0958:0A00  49 42 4D 42 49 4F 20 20-43 4F 4D 27 00 00 00 00   IBMBIO  COM'....
0958:0A10  00 00 00 00 00 00 00 60-68 06 02 00 00 12 00 00   ........`h......
0958:0A20  49 42 4D 44 4F 53 20 20-43 4F 4D 27 00 00 00 00   IBMDOS  COM'....
0958:0A30  00 00 00 00 00 00 00 60-68 06 07 00 00 43 00 00   ........`h....C..
0958:0A40  43 4F 4D 4D 41 4E 44 20-43 4F 4D 20 00 00 00 00   COMMAND COM ....
0958:0A50  00 00 00 00 00 00 23 5A-29 07 18 00 00 45 00 00   ......#Z)....E..
0958:0A60  00 F6 F6 F6 F6 F6 F6 F6-F6 F6 F6 F6 F6 F6 F6 F6   .vvvvvvvvvvvvvvv
0958:0A70  F6 F6 F6 F6 F6 F6 F6 F6-F6 F6 F6 F6 F6 F6 F6 F6   vvvvvvvvvvvvvvvv
```

Figure 2. First part of sector 5.

```
-E 0A60
0958:0A60  00.46   F6.4F   F6.4F   F6.42   F6.41   F6.52   F6.20   F6.20
0958:0A68  F6.20   F6.20   F6.20   F6.08   F6.00   F6.00   F6.00   F6.00
0958:0A70  F6.00   F6.00   F6.00   F6.00   F6.00   F6.00   F6.5C   F6.42
0958:0A78  F6.36   F6.07   F6.00   F6.00   F6.00   F6.00   F6.00   F6.00
-D 0A00
0958:0A00  49 42 4D 42 49 4F 20 20-43 4F 4D 27 00 00 00 00   IBMBIO  COM'....
0958:0A10  00 00 00 00 00 00 00 60-68 06 02 00 00 12 00 00   ........`h......
0958:0A20  49 42 4D 44 4F 53 20 20-43 4F 4D 27 00 00 00 00   IBMDOS  COM'....
0958:0A30  00 00 00 00 00 00 00 60-68 06 07 00 00 43 00 00   ........`h....C..
0958:0A40  43 4F 4D 4D 41 4E 44 20-43 4F 4D 20 00 00 00 00   COMMAND COM ....
0958:0A50  00 00 00 00 00 00 23 5A-29 07 18 00 00 45 00 00   ......#Z)....E..
0958:0A60  46 4F 4F 42 41 52 20 20-20 20 20 08 00 00 00 00   FOOBAR      .....
0958:0A70  00 00 00 00 00 00 5C 42-36 07 00 00 00 00 00 00   ......\B6.......
-W 958:000 1 0 6
-D

[C:\] >DIR B:

 Volume in drive B is FOOBAR
 Directory of  B:\

COMMAND  COM    17664   9-09-83  11:17a
        1 File(s)    321536 bytes free
```

Figure 3. Adding a volume label.

We are going to explore the directory of the disk that you have formatted for this exercise. Make sure again that it has the system on it. Put the disk with DEBUG into drive A, the other disk in drive B and type:

```
A> DEBUG
```

The DEBUG prompt is a taciturn dash (-). When it appears on the screen, we commence with the LOAD command. Let's start off by strolling through the first few sectors by loading absolute sectors 0 to 5. For those unlucky readers who don't have the computer grafted to their left hands, Figure 2 is a printout of part of sector 5. Type:

```
- L CS:000 1 0 6
```

DEBUG will load (L) 6 sectors, beginning with sector 0, from drive 1 (the B drive) into memory at the address specified by the contents of the CS register (which contains the current code segment), starting at offset 000 hex. If an offset is not specified, DEBUG will load the data into memory beginning with offset 100. Next, we will dump (D) the sector data we just loaded into memory, beginning at offset 000.

Each time a dump command is given, DEBUG displays one-quarter of a sector (128 bytes), 16 bytes to a line. This is particularly convenient in our case, because two lines (32 bytes) specify one directory entry. So, begin dumping memory by typing:

```
- D CS:000
```

This starts the memory dump at offset 000; if the CS:000 is omitted, DEBUG will begin the dump at offset 100. Once the command has its bearings, so to speak, each additional dump command continues where the last one left off. There is no need to specify an offset after the first time. Continue typing D's until sector 5 appears—the beginning of the disk directory.

The far lefthand columns give the segment and offset address in hex. The example in Figure 3 has a segment address of 958; the offset of this sector is A00. The central section of the dump is arranged in pairs of hexadecimal numbers, each pair making up one byte of data. The ASCII equivalent of this byte is represented on the right side of the page.

As mentioned above, 32 bytes are allotted for each file entry. The first 11 bytes are the file name (eight bytes) and

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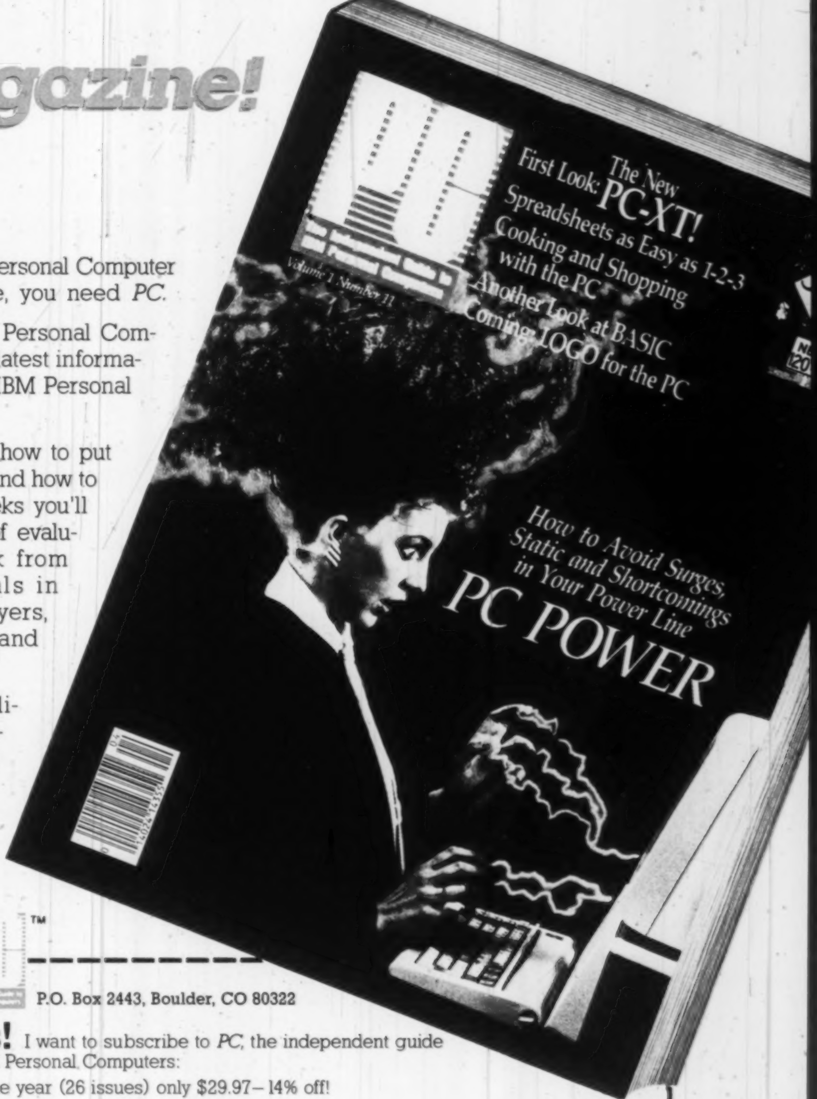
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	OFFSET															
0958:	0A00	0A01	0A02	0A03	0A04	0A05	0A06	0A07	0A08	0A09	0A0A	0A0B	0A0C	0A0D	0A0E	0A0F
HEX	49	42	4D	42	49	4F	20	20	43	4F	4D	27	00	00	00	00
ASCII	I	B	M	B	I	O			C	O	M					

Figure 4.

Bit # :	7	6	5	4	3	2	1	0
Attribute:			archive	subdir	vol. name	system	hidden	read-only
Hex Value:	40	30	20	10	8	4	2	1

Figure 5.

the file extension occupies the next three bytes as shown in Figure 4.

The very first byte of the entry (at A00 here) indicates the status of the filename. Hex 00 means the entry has never been used. This indicator is used to limit the length of directory searches. DOS reads directory entries sequentially; when it finds a 000 in the first byte of an entry, it knows that all of the file names in the directory have been read and stops looking for more entries.

If the file you specified wasn't located, DOS laconically informs you with a FILE NOT FOUND and throws the ball into your court. If the first byte of the file name is hex E5, it means the file has been erased. This is why file recovery programs have problems coping with erased files whose names were identical except for the first letter. If you are in the habit of naming groups of files like FREEP, GREEP, and CREEP, and then erasing them, you are endangering your sanity. Better you should name them REEPF, REEPG, and REEPC.

Byte 11 is a particularly useful one. It embodies the so-called file attributes: hidden, system, normal, volume label, subdirectory and archive bit. There is a table on page C-4 of the DOS 2.0 manual that gives the values of this byte for various attributes. Each bit in the byte is assigned an attribute, although some of the bits are not defined in DOS 2.0. At the moment, the assignments are as shown in Figure 5.

A swift calculation on both thumbs reveals that 00000010, the binary code for a hidden file, translates to 02 hex. Similarly, 00000111, 07 hex, means the file is hidden, system, and ready-only. Consulting byte 11 (offset 0A0B) in the first directory sector reveals that IBMBIO.COM has an attribute byte of 27. In addition to the hidden system and read-only bits, the archive bit has been turned on for this file (20 + 4 + 2 + 1). The archive bit is activated whenever the file has been written to and closed. It is used by the fixed disk utilities BACKUP and RESTORE to see if a file has been changed since it was last backed up. The attribute byte of a file can, of course, be changed to reflect the personal tastes of the programmer.

Bytes 12-21 in the directory entry are not used for anything yet. The chances are even-steven that DOS (upwardly-compatible-with-Unix) 3.0 might do something interesting with them. We skip merrily over them to note that bytes 22-23 map the file creation/update time and 24-25 contain the file creation/update date. The DOS manual has a moderately murky explanation of the coding scheme used to represent these numbers. Study this section if you like binary numbering schemes.

A directory would not be worth its nibbles if it did no directing; it performs this function by pointing to the place on the disk where the file begins. Bytes 26 and 27 contain the relative cluster number of the first cluster of the file. Once DOS finds the starting cluster, it turns to the file allocation table (FAT) for information on where the remaining clusters of the file are found. Disk data are mapped beginning with cluster 2 because the first two clusters are used to code the disk format. A discussion of the FAT is deferred until an adequate supply of celery can be laid in.

Changing the bytes in the directory is a matter of using the DEBUG E (for enter) command. There are two ways to use the enter command: prompted and unprompted. In the latter method, the contents of one or more bytes are replaced by values supplied in a list. With the prompted method, used here, DEBUG displays a byte at a time and waits for input. To change the byte, just type the desired (hexadecimal) characters. Pressing the spacebar advances to the next byte and typing a hyphen backs up to the preceding address. When all entries have been made, a carriage return ends the ENTER command. Let's first give IBMBIO.COM a normal attribute by changing the byte at A0B, presently a 27, to 00. Type:

```
- E A0B
```

DEBUG responds with:

```
0958:0A0B 27._
```

Type:

```
00 (carriage return)
```

Now if you look at the sector by typing:

```
-D 0A00
```

The first line looks like this:

```
 0958:0A00 49 42 4D 42 49 4F 20
20-43 4F 4D 00 00 00 00 00
```

The next thing to do is write the change back to the disk and return to DOS by typing:

```
-W CS:000 1 0 6
-Q
```

A directory listing will now have shown two files, IBMBIO.COM and COMMAND.COM.

Recovering An Erased File

The next exercise requires an erased file to recover, so erase IBMBIO.COM, return to DEBUG and load the directory sector again. The first line shows:

```
 0958:0A00 E5 42 4D 42 49 4F 20
20-43 4F 4D 00 00 00 00 00
```

The ASCII representation of the file name reads eBMBIO.COM. Change the E5 back to an I (49 hex) with the enter command:

```
-E 0A00
958:0A00 E5._
49
```

Write the information back to the disk, quit and list the directory. IBMBIO.COM has been recovered from the great erasure fields in the sky. This recovery technique can be successfully used only if, after an accidental erasure, nothing has been written to the disk. Once a file has been erased, all of its clusters are put back into the legally allocatable pool. In the case where the accident has been followed by some file-writing commands, there are two alternatives (three if you count suicide).

First, grab an unerase utility that can salvage a file, cluster by cluster (Norton's *Unerase*, for example). Second, load the entire disk into memory, a piece at a time if necessary, page through the sec-

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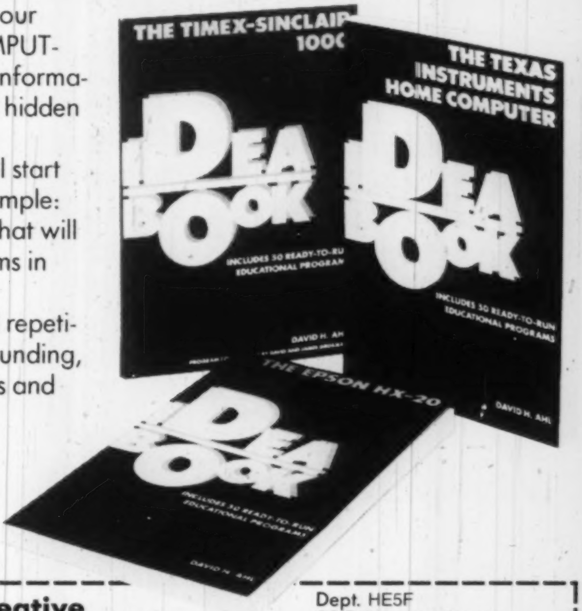
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tors, and note where the sectors with the file data are. Use DEBUG to name a file, load the correct sectors into memory, and then write them back to disk. This technique is not recommended for the nervous. A variant on this would be to use SHIFT-PrtSc to get a hard copy of the file data and then type them in again without trying to save them to a new file name.

Adding A Volume Label

Adding a volume label to a disk after it has been formatted without one can be done fairly easily with DEBUG as well. The drill is: find an empty directory slot, write in a volume name of 11 characters or less, plug in an attribute byte of 08, and write the information back to the disk. Supposedly, the disk you have been using contains only three files; the remainder of the directory should look like Figure 3, where the first empty directory slot is at 0A60.

The first 11 bytes of the entry will contain the volume name. If the chosen name has fewer than 11 characters, fill the remaining slots with hex 20's, then drop the attribute byte of 08 into offset 0A6B. Accuracy sticklers will want to add the date and time of creation.

Page C-5 of the DOS manual explains the encoding procedure. Changing the volume label is a mere matter of altering the desired bytes with the enter command. Figure 3 shows the entering sequence and the directory sector after a volume name transplant.

There are probably some readers who are thinking about the bagel slicing facility and are standing around with a fully-flavored specimen (raisin, garlic, salt, tofu) in hand just waiting for me to get to the good part of this tedious technical discussion. It is really very simple. First, hone one side of your DEBUG disk to a keen edge. This can be conveniently done with any whetstone or razor strop. Next, slide the bagel into drive A or B, leaving the door ajar. Finally, position the sharpened edge of the disk in the drive slot and press firmly.

Word Processors

I have not talked at all about word processors in these columns, mainly because such information can be found these days by reading almost any variety of printed material (excepting, I guess, *True Confessions* and *The Journal of Virology*.) There are somewhere around 250 word processors available for the IBM PC; almost all of them are capable of basic functions such as entering, editing, and formatting text. Some have features that are needed by manuscript writers (indexing and leadering) while others are best used for writing letters and short articles.

Almost everyone who has a PC owns (and swears by) at least one of them and, for some people of my aquaintance, devotion to a particular word processor approaches religious fervor. I have had the opportunity to test quite a few, and I must admit that I have developed a rather blasé attitude towards them. Most of them are pretty good, but very few rate the Gold Write-Protect Label Award of Excellence.

Naturally, this is all leading up to something. I have run across a word processor that is amazingly versatile, beautifully engineered, and fully stocked with a range of features that is nothing short of remarkable. It is called *Xywrite II*, and is a product of Xyquest Inc. It can be used either as a program editor or as a word processor, a convenience not provided by my usual word processor. Programs can be executed from inside *Xywrite*, therefore you can edit and run code without having to exit to DOS, and your favorite spelling checker can be executed from inside *Xywrite*.

In fact, DOS can be run as a subtask of *Xywrite*. Typing DOS on the command line loads a secondary command processor, and all operating system tasks can be performed as usual. Typing EXIT after the DOS prompt puts you back into *Xywrite*. This feature alone is worth the reasonable price of $195, but there is a plethora of other niceties provided by this program that make it, in my mind, one of the best of its genre I have seen to date.

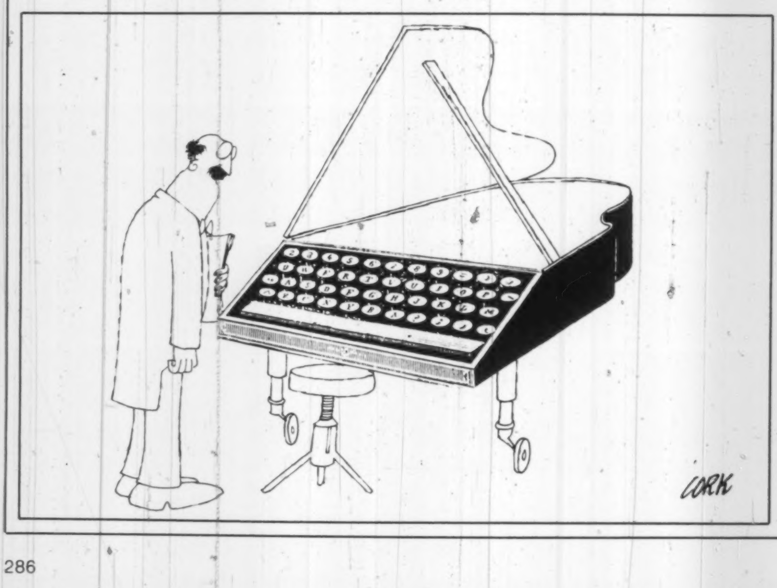
Xywrite depends heavily on the function keys to execute many commands: defining text blocks for moving, copying, deleting, toggling the cursor between the user definable windows, and changing the prompt line. Most of the formatting commands are executed from a command line. I never thought that I could get used to a command line word processor, but this program implements this concept in such a natural manner that it soon became completely comfortable to use.

Xywrite does on-screen formatting with a few caveats: text is always shown single spaced, regardless of the actual line spacing, and page breaks are not shown. It is possible, with a couple of keystrokes, to preview the text as it will appear on the printer, but editing cannot be done on this screen. The next version of *Xywrite* will incorporate page breaks and line spacing in the normal mode.

Xywrite lets you take full advantage of your printer. It comes with printer drivers for the most popular machines, and these files are not only available for inspection, but can be changed to your liking. The MODE commands available from the keyboard show bold face, underlining, and reverse (or different colors with a color graphics adapter) on the screen. Each of these modes can be assigned to a typeface, so, for example, if you wish, double wide type can appear in magenta on a yellow background (or flashing reverse on an IBM monochrome display).

All of the modes can be customized from the keyboard and the printer files. In addition, *Xywrite* has made obsolete last month's printer table program; a translating table file can be set up such that the entire character set of the IBM PC can be assigned to such special printer characters as your machine can provide.

Xywrite does tables of contents, indices, leadering, and math. It has power-



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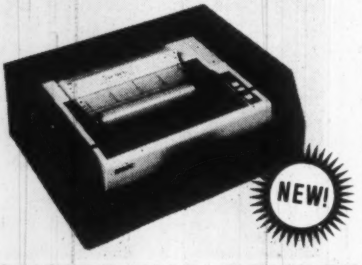

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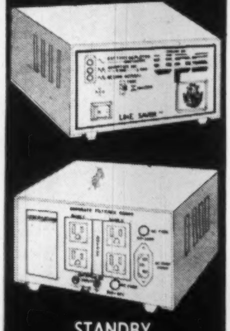

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ful macro capabilities as well, and blocks of text can be assigned to a single keystroke for boilerplate assembly. There are some extra nifty features rarely found in word processors too. An automatic uppercase command capitalizes the first letter following the end of a sentence—a real blessing considering the position of the SHIFT keys on the PC keyboard. A "forms" mode can be used to design pages with protected areas; these forms can be saved as is or as regular text files for later editing. Print spooling, of course, is available, as is a PAUSE command for single sheet printing.

Formatting commands embedded in the text can be viewed in two modes: normal and expanded. In the normal mode the commands appear as little bright triangles and, if the cursor is positioned on top of one, the formatting command contained therein can be seen on the prompt line. In the expanded mode, the command is written out in full between European quote marks. Formatting commands can be edited like any other text, so sets of favorite formats can be saved and loaded at start-up time, or changed without having to delete and re-enter an entire set of commands.

There are four help screens available; you have the option of loading these into memory for really quick on-line help. Because the screens are stored as regular text files, you can edit them too. *Xywrite* is very, very fast. Paging and reformatting is instantaneous. The human interface is excellent and every time I have called Xyquest with a question or suggestion they have been responsive and helpful in every possible way.

The documentation is pretty good, but is slightly confusing in places and would benefit from a set of section dividers. I am undecided about the aesthetics of the display. The prompt line is on top of the screen, and this is very tiring on the eyes. On the other hand, there are Caps Lock and Num Lock indicators, the lack of which in another word processor has sometimes elicited amazingly unbecoming language from my normally temperate tongue.

Xywrite does lack some features that I sorely miss from my former word processor. These include the aforementioned page breaks and on-screen variable line spacing. Also lacking are row and column counters. When a file save/return is executed, the cursor goes to the beginning of the file—a real annoyance especially considering that there are no page numbers or GOTO commands (yet). Every time I have called to moan, wail, and petition for some addition, I am always assured that they will be incorporating these features in the next version. Their update policy is generous: free updates for bugs, $20 for an update, and trade-ins taken for new version numbers (e.g. *Xywrite III*).

Lasercycles

Lasercycles, brought to you by the Brady company, was inspired by the lightcycles featured in the movie *Tron.* I thought this scene was one of the most visually dazzling features of an otherwise dramatically vapid movie. Although *Lasercycles* is not quite as hair-raising, it is fun to play. The player is allowed three cycles and wins an additional cycle when a level (consisting of several arenas) has been successfully completed.

The concept is one of supreme untidiness: as it whips around the screen in an attempt to avoid an energy glob, each cycle leaves a trail behind. The globs track the trajectory of the cycle and can be eliminated only by causing them to run into an energized section of the trail.

A unit of energy either produces an energized section, or gives the cycle a brief moment of overdrive. Each arena comes equipped with five units of energy, and extra energy can be absorbed by directing the cycle into an occasionally visible power unit. There are numerous levels of difficulty in which the globs and cycles move faster, the energy sections become smaller and the walls of the arena shrink. The authors have kindly permitted alteration of the game parameter table with any program editor.

Movement in the game is best directed with a joystick, although it can be played from the keyboard. Once the game gets started, it moves very fast, but getting the game on the screen requires untold patience: it takes forever to load and initialize. Because it is copy protected, it cannot be put on a RAMdisk, and *Lasercycles* goes back to the disk for a painfully long interval of whirring between each game. Pressing a key at the inappropriate moment confuses the program, so it's hands off the keyboard until the prompts appear. The game is an entertaining and a refreshing change from slaughtering aliens or chasing fruit around a maze.

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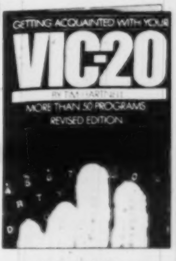

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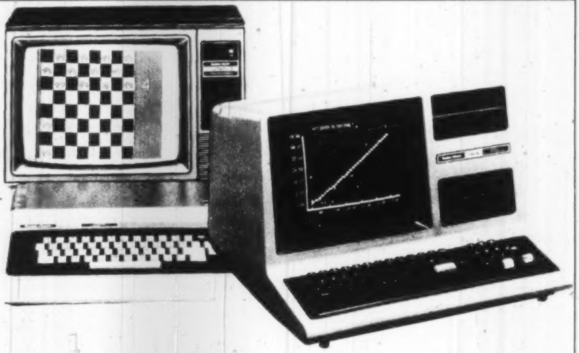


TRS-80 Strings

Stephen B. Gray

As we begin George Orwell's Year with the fifty-ninth TRS-80 Strings column, we look at a new Pocket Computer from Big Brother, a "trial version" of Pascal, a utility program that lets you execute files from the directory, and a highly useful and versatile database manager. Sorry, no room for a Short Program this time around.

Pocket Computer PC-3

If you were wondering about the gap between the PC-2 and PC-4, it was filled last Bastille Day, July 14, when Radio Shack announced the PC-3, "small enough to fit into a shirt pocket" (Figure 1). It is about $5^1/_4$" long, as compared with the PC-2, almost $7^3/_4$" long.

Compatible with the PC-1, which it replaces, the PC-3 provides 16 arithmetic and eight string functions and features a 24-character LCD display, accuracy up to 10 digits, and a 1.4K memory.

Other features include arrays and multiple statements. Strings hold up to seven characters. The PC-3 can also be used as a direct key-entry calculator.

The PC-3 is $99.95. The matching PC-3 printer/cassette interface, at $119.95, permits use of a cassette recorder to load and store programs and data on tape. The thermal dot-matrix printer produces a 24-character line, one line a second.

The interface is required to use Radio Shack's existing PC-1 library of 19 programs.

Pascal 80 Trial Version

If you have been reading *Creative* for several years, you may remember the Atari column that George Blank started writing in the June 1980 issue and the many articles he wrote in 1981-82 while he was the editorial director of the magazine.

George left *Creative* in 1982 to start his own company, New Classics Software, which offers Pascal 80, at $100, for the TRS-80 Models I, III, and 4 (in Mod III mode).

For those who want to try Pascal, but aren't sure they want to invest $100, New Classics has been offering, since June 1983, Pascal 80 Trial Version, for only $14.77. The cover of the little four-page manual (Figure 2) tells which features the trial version supports.

The back cover is worth quoting in full because it tells most of the story:

"The Pascal 80 Trial Version is a version of Pascal 80 designed to demonstrate many of the features of the language for those who are unsure about purchasing the full version. It can be an excellent introduction to programming in Pascal.

"The main difference between the two versions is that programs cannot be stored or retrieved in the trial version, while the full version allows you to save text and object files, append, include and chain programs, load text files, execute object files, and create command files for direct execution from DOS.

"Some of the other features found in the full version, but not in the trial version, include random and sequential disk files, pointer variables, curly braces for comments, the underline character in variable names, random number, graphic, and cursor control functions.

"Other than this brief pamphlet, no support can be provided for the trial version. Those desiring more information should consult a text book on standard

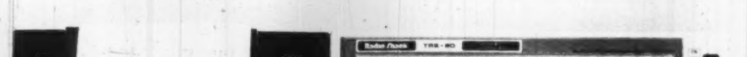


Figure 1. The Pocket PC-3, which fits into a shirt pocket, is shown here plugged into the matching PC-3 printer/cassette interface.

Pascal. We suggest *Oh! Pascal,* by Cooper and Clancy, which is available from New Classics Software for $20. Of course, those purchasing the full Pascal 80 will receive a 92-page, fully indexed manual in a three-ring binder, and telephone support will be available."

Although the trial version doesn't include pointer variables or disk files, nor does it allow you to save programs, you can list your programs to a printer.

Monitor and Editor

The other two pages of the manual tell how to get a listing of a program and briefly describe the monitor commands and the editor.

The monitor has five commands: E to enter the editor, K to clear the editor, Q to quit to DOS, C to compile, and R to run.

The text editor uses arrow keys to move the cursor about the screen, and has nine control functions that delete a character, erase a line, insert a space or a blank line, display the next or previous 15-line page, write the program to the printer, position the cursor at the beginning of the work space, or return you to the monitor menu.

Boot up Pascal 80 Trial Version, and the first display tells you:

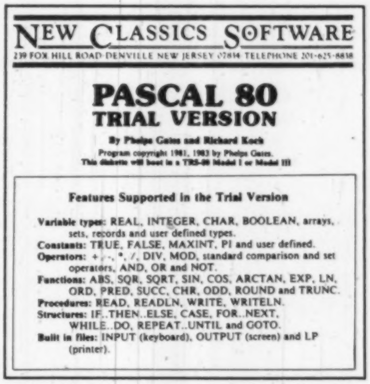
```
THIS DISK WILL BOOT UP IN
A MOD I OR A MOD III. IT
WILL XFER THE FILES TO A
TRSDOS SYSTEM OR FORMATTED
DISK ON ANY DRIVE. IT IS
ALSO READABLE AS A DATA DISK
BY MOST POPULAR SYSTEMS.
```

You have to transfer the files to a disk that is already formatted or has TRSDOS on it. This way, New Classics can distribute a single disk for both the Model I and III/4. The disk can also be read as a data disk by LDOS, MULTIDOS, or DOSPLUS.

In TRSDOS (or whatever DOS you are in), you type in PASCAL, and you get the monitor menu. Press E, and you are ready to write a program in Pascal.

For example, to add 2 and 3, you need all of this:

```
PROGRAM SUM;
VAR SUM: INTEGER;
BEGIN SUM:=2+3;
WRITE (SUM)
END.
```



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PASCAL 80
TRIAL VERSION

By Phelps Gates and Richard Koch
Program copyright 1981, 1983 by Phelps Gates.
This diskette will boot in a TRS-80 Model I or Model III

Features Supported in the Trial Version

Variable types: REAL, INTEGER, CHAR, BOOLEAN, arrays, sets, records and user defined types.
Constants: TRUE, FALSE, MAXINT, PI and user defined.
Operators: +, -, *, /, DIV, MOD, standard comparison and set operators, AND, OR and NOT.
Functions: ABS, SQR, SQRT, SIN, COS, ARCTAN, EXP, LN, ORD, PRED, SUCC, CHR, ODD, ROUND and TRUNC.
Procedures: READ, READLN, WRITE, WRITELN.
Structures: IF..THEN..ELSE, CASE, FOR..NEXT, WHILE..DO, REPEAT..UNTIL and GOTO.
Built in files: INPUT (keyboard), OUTPUT (screen) and LP (printer).

Figure 2. The features supported by Pascal 80 Trial Version are spelled out on the front cover of the manual.

If you are familiar with Basic, most of this may seem unnecessary. But leave off the first line, and you get this display:

```
00:32:20 COMPILATION STARTING
0000 VAR SUM: INTEGER;
      ↑
EXPECTED PROGRAM
```

which means the compiler expected to find a PROGRAM line. The arrow points to where the compiler discovered the error, which may not be where the error is.

The 00:32:20 is a clock that indicates when the program was compiled. It is not an elapsed timer, so you must keep track of the previous time to calculate the compilation time, if you wish. In the full version, you can reset the clock to 00:00:00 with POKE commands.

Leave out the second line, and the display shows what has been compiled so far, with an arrow pointing to SUM, and displays:

```
UNDECLARED
```

to let you know what you left out.

Omit INTEGER from the second line, and the error message is:

```
BAD TYPE
```

to let you know that variables (and constants) have to be declared as to type.

And so it goes, with the editor helping you along, supplying more complete error messages than you will find in Basic. These messages, by the way, are unique to Pascal 80.

Software Bargain

Pascal 80 Trial Version looks like the software bargain of the year; the $14.77 includes postage and shipping charges. It comes with a coupon worth $10 off the regular price of Pascal 80; which makes it $90.

New Classics is hard at work converting Pascal 80 for the Model 4, to use the 24-by-80 display. This Model 4 version will be available separately.

The $14.77 price, incidentally, covers only the costs of the advertising, mailing, and the disk itself. Thus the disk is actually being given away, to provide prospective users with a taste of Pascal 80, as well as of Pascal itself.

The coupon packed with the trial version mentions a Pascal 80 User Group Game Disk for $10, and a Pascal 80 User Group Procedure Library Disk for $10. The latter is a collection of procedures to use in one's own Pascal programs, and George has very kindly offered to send it free to those who mention this column when ordering either version of Pascal 80.

If you are at all interested in the language that many computerists claim will supersede Basic, check out Pascal 80 Trial Version, from New Classics Software.

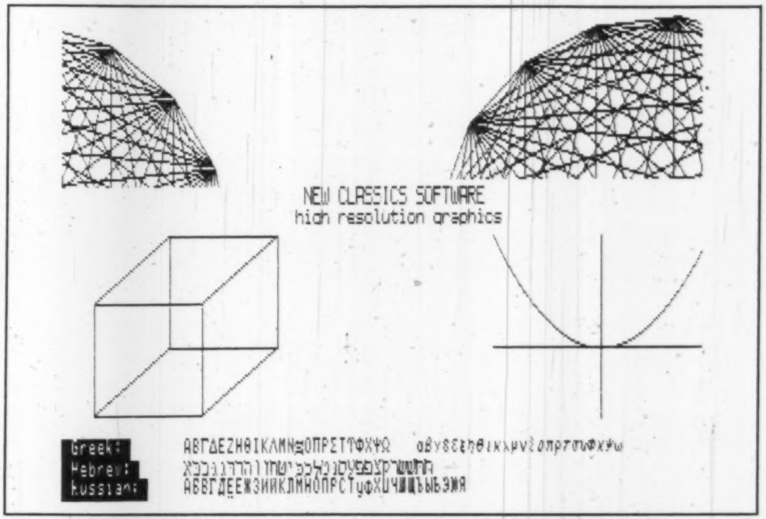

Figure 3. The New Classics hi-res package for Pascal 80 provides graphics, several character sets, and more.

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TRS-80 Strings, continued…

Pascal 80 Hi-Res

New Classics has just developed a high-resolution package for Pascal 80, for users with Radio Shack's hi-res board in the Model III or Model 4, and at least 48K of memory.

The $39.95 package offers regular graphics, turtle graphics, turtle geometry, character sets for Greek, Russian, Hebrew, and Japanese katakana, plus math symbols and two ASCII sets (Figure 3). These can all be intermixed on a 24-line, 80-column screen, using regular or inverse characters.

CO-DIR Utility

CO-DIR 2.0, from Picotrin Technology, is a utility program that lets you perform, with only one or two keystrokes, nearly all the DOS commands related to individual files on disk. It lets you process the files directly from the listing on a directory screen.

CO-DIR 2.0, which stands for Cursor Oriented Directory Version 2.0, works on any TRS-80 Model I, III, or 4 with at least 32K, and uses NEWDOS/80 1.0 or 2.0, or DOSPLUS with the CAT library command (version 3.4 or later). The price is $49.

With *CO-DIR,* you can do some things that are difficult or impossible without it. For example, if you try to LIST the PATCH/BAS routine in DOSPLUS, you get a:

```
RUN access only
```

message. But with *CO-DIR,* you simply call up the directory, center the cursors on PATCH/BAS, hit L, and you get a complete listing, without line numbers. (No, you can't LIST password-protected routines.)

With *CO-DIR,* you can execute a file right from the directory. Center the cursors on the file, and hit ENTER. If *CO-DIR* finds no CMD extension, it assumes the file is Basic, so it loads Basic and then runs the file. If you hit ENTER and then the spacebar, you force *CO-DIR* to execute a file as CMD even if no CMD extension is found.

Other *CO-DIR* functions include: copy a file to a specified drive, show a free-space map for any drive, load (or list, modify, print, kill, zero, or rename) a file, do a string-search for a file name (including by extension or wildcard). Assistance is available via a HELP function.

Hit J, and you have activated the Job Control function, which allows you to activate a DO or CHAIN file; NEWDOS/80 uses /JCL files, DOSPLUS uses /BLD files.

CO-DIR even includes sound. Hook up an amplifier via the cassette port: low chirps mean a function is completed; high chirps mean there is an error in your instructions, or *CO-DIR* can't perform the function.

If you do a lot of programming, *CO-DIR* could be the most useful utility you have ever bought, because it makes the DOS functions faster and easier.

Data-Writer

Written by Software Options Inc. for the TRS-80 I/III/4 (48K, two disk drives, lowercase required), *Data-Writer* is a database manager that can be used with your word processor (*Scripsit, Lazy Writer,* or *Electric Pencil*), or by itself as a complete stand-alone system for managing text and numeric data.

Data-Writer consists of twelve programs for managing and using databases, including changing their structures. Other tasks easily performed with *Data-Writer* include mailing list maintenance, form letter production, and so on.

Data-Writer 2.0 is $145. If that sounds expensive, take a look at all it does; it may well be the most extensive DBMS program of its type available. Software Options claims it to be the most powerful for the TRS-80. Also, it supports a hard disk, unlike most DBMS systems. Radio Shack's *Profile III* costs more ($199, $299 for the hard disk version) and is a good DBMS, but not as versatile as *Data-Writer.*

Data-Writer works with DOSPLUS 3.5 (and previous versions), LDOS 5.1.3 (and previous 5.1 versions), and with other operating systems.

Twelve Programs In One

The twelve programs consist of two for data entry (Entry, Edit), six for file management (Manage, Split, Stats, Math, Select, Sort), and four for output (Labels, Letters, Report, and Access).

Entry allows you to define up to 20 variable-length fields of up to 240 characters each with your word processor, or 20 fixed-length fields of up to 45 characters using Entry. Validity checks are optional.

Manage permits restructuring your database without having to edit it manually. You can add new fields, delete or rearrange fields, and append one field to another.

Split divides a database into several smaller ones and can do it on the basis of a data breakpoint.

Stats allows you to search your database for inconsistencies, displaying a statistical report showing any format errors.

Math lets you define fields as equations. You can calculate any fields in your database using the four basic functions, plus exponentiation. You may use up to 20 equations per run, and each equation may contain up to 255 characters.

Select enables you to create subsets of your original file by specifying limiting criteria, such as SELECT IF SEX = F, or SELECT IF AMOUNT > ZERO. Each subset is then stored under a new file name to be used as a new database.

Sort is a fast, two-level sequential direct-access sorting program that lets you sort on any field, even by last name or zip code embedded in a line. The *Data-Writer* ad says "it permits access to any record in your database (up to 10,000 records) in one second flat."

Letters permits creation of a form letter into which you can insert, from your database, up to 20 different names, addresses, amounts, keywords, and even phrases.

Reports is for writing reports, such as inventories, accounts payable and receivable, bibliographies, insurance coverage, stock issues, and so on.

Using Data-Writer

Data-Writer uses menus and prompts extensively, and is very easy to use. The first screen provides a menu of the main programs. Select *Entry*, and after you give your database a name, and decide which drive to store it on, you get this display:

```
 ===>>> DATA ENTRY - FIELD 1
 ===>>> TYPE A STAR (*) TO END
FIELD LABEL : ----------------
```

with space for 20 characters. Type in the label, and you get further prompts:

```
        FIELD LENGTH :
```

and

```
    MANDATORY ENTRY (Y/N) :
```

and then you have asked which of six validity checks you want performed at data-entry time, including no check, all numeric, length check, and so on.

After you are asked if you want to repeat this field from the previous record, you get a display of all you have just entered, so you can edit it, if you need to. If not, hit ENTER, and go on to the next field.

When you are through delineating the fields, hit * and you get a data-entry screen, showing all your field names and record lengths, with a blinking cursor at the beginning of the first field, ready for you to start entering data.

If you attach an amplifier and speaker to your cassette port, *Data-Writer* will signal an invalid entry, if you try to skip over a mandatory field, or try to type words in an all-numeric field.

After you have filled in the fields (and perhaps skipped over some of the non-mandatory fields), *Data-Writer* asks if you want to write the data to the file, edit it, or end using the current database.

Select the last option, and you are asked if you want to add more records to the current database or to a different one, or add to the abbreviation table, or end the program. The abbreviation table is a clever device that lets you enter as little as a single character, such as M, during data entry, and it will be expanded in the display, to Minneapolis, for example.

After Data Entry

After entering all the data for your database into the file, you can select data from it, add to it, edit it, restructure it, split it into several smaller databases, check it for errors, create subsets, sort, and print reports.

If you decide to sort, you have given the names of all the current field labels, so you don't have to remember them, and then you are asked which field labels are to be the primary and secondary sort keys. You can sort in ascending or descending order. Give the data to be sorted a name for its output file, and after the sort, the data will be stored under that name. Display the output file, and you see first the field labels, each on a separate line, and then the file data itself, with each item on a separate line.

The Bottom Line

Data-Writer has many more features, such as the many options available for creating reports, but there just isn't space here to describe them all. Among the DBMS programs I have tried so far, this is the best—very easy to use, with a maximum of features and flexibility. The combination of *Data-Writer* and a word processing program is all many people will need for what they want a computer to do.

The manual, also a winner, and more than 100 pages long, explains everything simply and fully and assumes no knowledge of computers or databases. END

Firms Mentioned In This Column

New Classics Software
239 Fox Hill Rd.
Denville, NJ 07834
(201) 625-8838

Picotrin Technology
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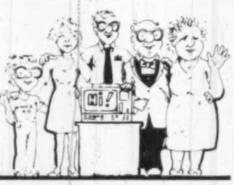

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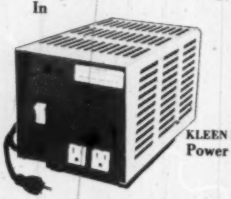

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Book Reviews

How to Buy a Personal Computer, by Carlton Schrum. Alfred Publishing Co., 15335 Morrison St., Sherman Oaks, CA 91403. 64 pages, paperback $2.95. 1981.
Understanding Artificial Intelligence, by Paul Y. Gloess. Alfred Publishing Co. 47 pages, paperback $2.95. 1981.
Understanding Basic, by Richard G. Peddicord. Alfred Publishing Co. 48 pages, paperback $2.95. 1981.
Understanding Cobol, by Richard G. Peddicord. Alfred Publishing Co. 47 pages, paperback $2.95. 1981.
Understanding Fortran, by Herbert R. Ludwig. Alfred Publishing Co. 61 pages, paperback $2.95. 1981.
Understanding Pascal, by George Ledin Jr. Alfred Publishing Co. 63 pages, paperback $2.95. 1981.

These six "Handy Guides," tall and slim (4¼" x 11"), are part of four Alfred series that cover computers, cooking, music and photography. They are all described on the back covers as "practical, economical and concise . . . perfect for today's fast-moving adult on the run, they fit in anywhere—in pocket, purse, gadget bag, guitar case."

The guide to buying a personal computer takes a fast but competent look at what such machines are, why you should buy one, how to choose, system requirements for specific applications, and ends with a 13-page table comparing 26 personal computers. This brief guide packs more information per page than most similar publications.

The guide to artificial intelligence is subtitled, "An introduction to the world of computers that 'think,' " and does quite well in only 47 pages. After a brief introduction, it looks at the minimax procedure for evaluating tic-tac-toe; Automatic Theorem Proving; Predicate Calculus; Lisp: A Language for AI; Communication, People and Computers; Computer Vision; and AI, a State of Mind. This is an excellent introduction; for those who want to learn more, five books and four journals are referenced.

The Basic guide gets into a three-line program by page 8, using REM, PRINT and END, and enlarges on that by introducing simple arithmetic, spacing, strings, INPUT, and by page 16 a program for compound interest. Later pages introduce flowcharts and arrays, IF/THEN, PRINT USING, FOR/NEXT, and READ/DATA. The book ends with an 8½-page glossary as the finish to a very handy guide to the basics of Basic.

The Cobol guide first examines the basic concepts of the language, describes a standard environment, and then presents six program examples: (1) very short, prints IT WORKS; (2) one variable, no files; (3) with decision, no files; (4) simple payroll system; (5) processing test scores; and (6) accounts payable. Each example is fully explained with a flowchart, program notes, explanations of new statements, and sample outputs. The excellent guide ends with a list of reserved words, a bibliography for "where to go from here," and an 8½-page glossary.

The Fortran guide jumps right into a simple program for summing 40 four-digit numbers, then shows the flowchart, and

Stephen Gray

explains the rules for admissible characters, variables and constants. From there it goes into statement layout, real/integer mode arithmetic, input/output, format, read/print, GOTO, IF, loops, DO, subscripts and arrays. Each statement is explained with a short program using it, with output if helpful. An 8½-page glossary ends this brief but very informative book.

The Pascal guide, written by the computer-series editor, introduces and discusses the language for seven pages before presenting two short programs, for printing a name and for making some geometry calculations. After discussing more Pascal features, the reader is asked to write a program; the solution is given on the next page. From there on the guide presents examples of each feature as it is discussed, with helpful program notes, and more exercises. The author covers subprograms, choosing (IF, CASE), looping (WHILE . . . DO, REPEAT . . . UNTIL), and data types. Very well written, the book ends by recommending two Pascal books for further reading.

These six guides are highly recommended to those who want to know just enough about a subject to be informed (but not overwhelmed by detail), or those who want to find out if they like the subject enough to want to go further with it. For $2.95 each, you can't go wrong; these six are well worth every penny. Six more very useful Alfred Handy Guides in the computer series will be reviewed here shortly.

TRS-80 Color Basic, by Bob Albrecht. John Wiley & Sons Inc., New York. 384 pages, paperback $9.95. 1982.

Because Radio Shack's Color Computer manual leaves much to be desired, authors like Bob Albrecht have stepped in to fill the gap by writing books such as this, which goes into much more detail than the skimpy original, and which is highly readable.

The 13 chapters cover an introduction, Easy Stuff (cursor, CLEAR, PRINT, ENTER, SOUND), Basic Programs, Number Boxes, String Boxes, Skipping Around the Screen (placing characters), Graphics Galore, Meandering (RND), Playtime Junction (IF/THEN/ELSE, INKEY$), String Functions, Subscripted Variables, Computing Problems and Challenges, and The Color Basic Toolbox (a quick reference guide). Eleven appendixes are about hooking up the computer, using a cassette recorder, error messages, arithmetic, reserved words, screen maps, sound and music, color codes and graphics characters, ASCII codes, joysticks, and a list of eight books and magazines on the Color Computer.

This is the sixth Self-Teaching Guide that Albrecht has written for Wiley. Each chapter in an STG consists of short sections called frames, most of which here end with questions or things to do on the computer. Each chapter begins with a brief list of what the chapter covers; if you feel you already know it, you can skip to the end of the chapter and take the Self-Test.

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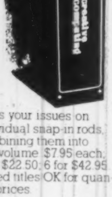

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Book Reviews, continued...

The answers to the Self-Test list the frame numbers that relate to the question, so if you miss one, you can review the related frames.

The only thing wrong with this book is that it doesn't cover Extended Color Basic because Albrecht knew his friend Don Inman was writing a book on the subject (published by Reston; it will be reviewed here).

Albrecht has had enough experience in using and teaching computers to know just what should be in such books and how to write them. There are many programs and examples of program lines, blanks to be filled in, explanatory callouts, explanations of program lines, etc. And above all, a clearly written, highly detailed text that covers just about everything you'd want to know about the basics of Color Basic.

It is indeed, as the back cover claims, an "entertaining self-instructional book" that is "the ideal introductory aid for kids, parents, and teachers using the Color Computer."

Learning TRS-80 Basic: for Models I, II/16 and III, by David A. Lien. CompuSoft Publishing, 1050-E Pioneer Way, El Cajon, CA 92020. 544 pages, paperback $19.95, plus $1.65 shipping and handling. 1982.

The back cover says this book is "completely reorganized and updated," but if you have read Radio Shack's TRS-80 *User's Manual for Level 1* and *Learning Level II,* (both by Lien), then you have read just about all but four chapters of his latest book.

Which is not to detract from *Learning TRS-80 Basic* at all; it is very well written and deserves the high praise it has received. But if you have read those two previous books, you may not want to spend $19.95 for the 30 pages that comprise the four new chapters.

Twenty-six chapters are taken from the first book, and twenty from the second, almost word for word. An extra-wide right margin contains notes that indicate how some models may differ from the text, especially the Model II.

The entirely new chapters are 20: Intermediate Basic (multiple-statement lines, variable names, shorthand tricks, arrow keys, optional NEXT, POS(N), etc.); 41: Advanced Graphics (string packing, array loading, cursor control codes, graphics-character code patterns); 42: Graphics INKEY$ (real-time input); and 44: Model III POKE Features (cassette-speed changes, foreign character set, video-display memory).

If those four chapters sound interesting, and if you haven't read the two previous TRS-80 books or would like all the information in one handy volume, this is one of the basic books for your library, with over 500 pages of easily understood text written by a born teacher. If you want more details than you found in the Radio Shack Level II manual, this book belongs on your shelf.

Pet Talk, by Evelyn B. Avsharian. Kids Computer Series, Box 1411, Ann Arbor, MI 48106. 47 pages, paperback $5.95. 1980.

This book for beginning users of the Commodore Pet computer was developed for third grade and up. According to the accompanying letter, "Teachers and older teenagers who would like to learn about beginning programming for computers will enjoy sailing through this non-technical tutor in 3-4 hours. Students age 7 or more can (without a teacher) sit down with a computer for the first time, and, using *Pet Talk,* immediately begin to operate, experiment, and learn from this self-teaching book."

The book is completely handwritten, with large block lettering. Each page covers a different topic. The first page starts by telling how to turn on the Pet, "Turn me on by pressing the switch on my back. I have a Flashing White Square that's like a magic crayon. It's called a CURSOR." The page goes on to ask the reader to look for the up/down CRSR and SHIFT keys, to press them and see what happens.

Subsequent pages introduce the various command keys. By page 9, the reader learns how to type in a short PRINT line, which is expanded upon in the following page. He then learns how to use LIST, and the comma and semicolon for spacing. By page 15 he writes a second program, using INPUT, and learns the use of N$, which isn't called a string (or anything else) in the book.

Later pages introduce GOTO, the four math functions, REM, IF/THEN, END, and the beginning of string manipulation, with LEFT$, RIGHT$, MID$ and LEN, and then TAB and a short program that displays a sinewave using TAB.

Page 11 reviews the material up to that point, pages 28-30 review later material, and pages 31-32 offer a test, with blanks to be filled in.

This is just about the easiest way to learn elementary Pet Basic, and although there are a couple of places where the writing is somewhat strained (as in "You can even type line numbers in that are out of order . . . ."), they are minor items in a very well written text that can be recommended for children in the third and fourth grades, or for anybody who wants a simple and easy introduction to Pet Basic.

Kids Can Touch: A Child's Guide to the Apple II Plus Computer, by Patricia M. Schillingburg. Kids Can Touch, 6 Magnolia Place, Summit, NJ 07901. 47 pages, paperback $4.95, plus $1 shipping. 1981.

According to the letter accompanying this book, "Children take computers for granted, but computers are often threatening to adults. They think they need to be math experts to work them, or they fear they might cause destruction. Neither of which is true. However, these myths need to be exploded." This book, "to be used with the Apple II Plus and written for 10 year olds, meets the needs of both audiences," and is a "lively self-teaching guide with whimsical illustrations," the letter continues.

The seven chapters are titled: It's for Kids (parts of the computer, how to turn it on, booting a disk, simple commands, etc.), Your Name's The Game (loops, PRINT, GOTO, RUN, LIST, NEW), More Programming (disks, SPEED, HOME, FLASH, NORMAL, INVERSE, strings, GOTO, GOSUB, INPUT, SAVE, LOAD), Starting a Conversation (IF/THEN, spacing, FOR/NEXT, DATA/READ, bugs), The Big Switch (microchips, binary numbers, languages), Why Computers? (brief history), and Computers Have Come and Are Here to Stay (effects of computers).

Meant to be used along with an Apple II Plus computer, this book, although fairly well written, is for an audience somewhere between young children and adults. Adults will be bored with the "See Spot run" writing, such as "There is a MONITOR. It is a viewing screen, or an actual television, which allows the computer to talk to us." On the other hand, the average fifth-grader may be put off by the vocabulary, by the long sentences, by page after page of solid text, all in dot-matrix print with short extenders and thus not easy to read, and all right-justified, which means a lot of extra spaces in each line, making it even harder to read. The delightful illustrations are the best part of this book.

The book should be OK for brighter kids, or for adults intimidated by more complex texts. However, it would have been much better had the author worked in conjunction with a schoolteacher, tailoring the book to the average ten-year-old. END

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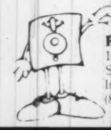

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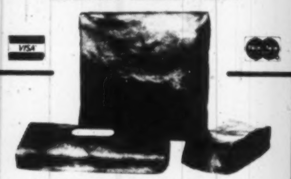

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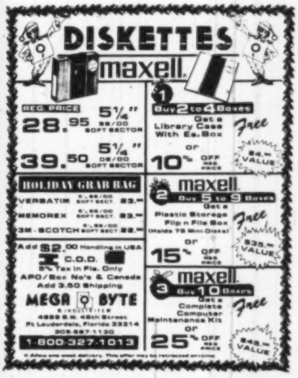
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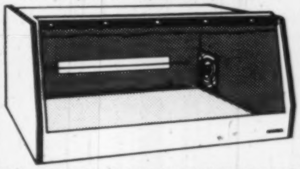

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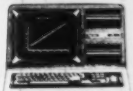

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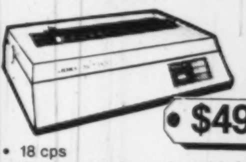

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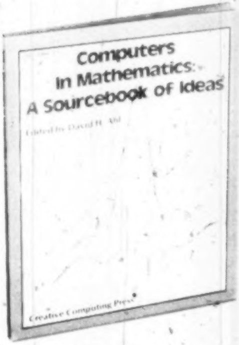

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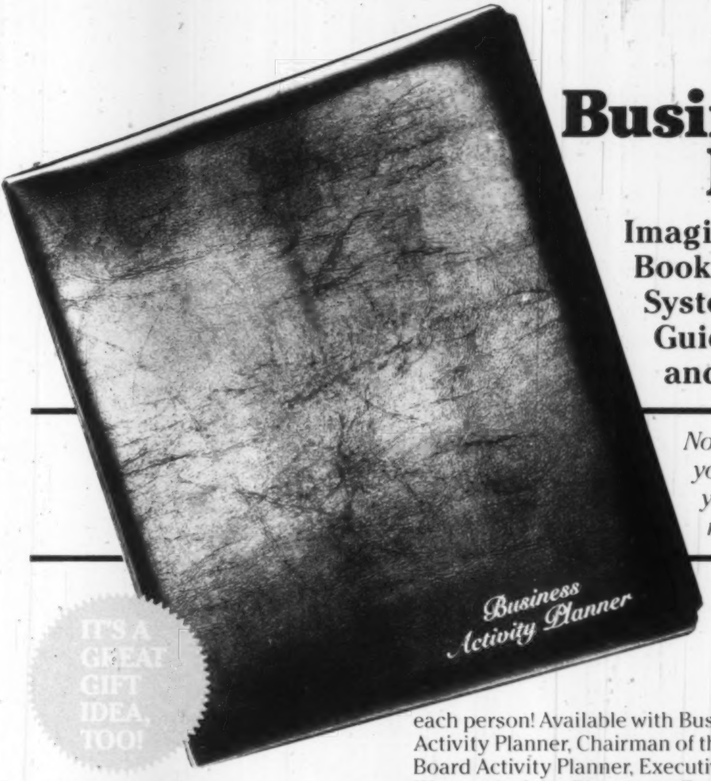

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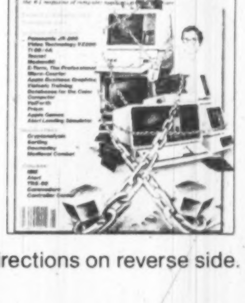

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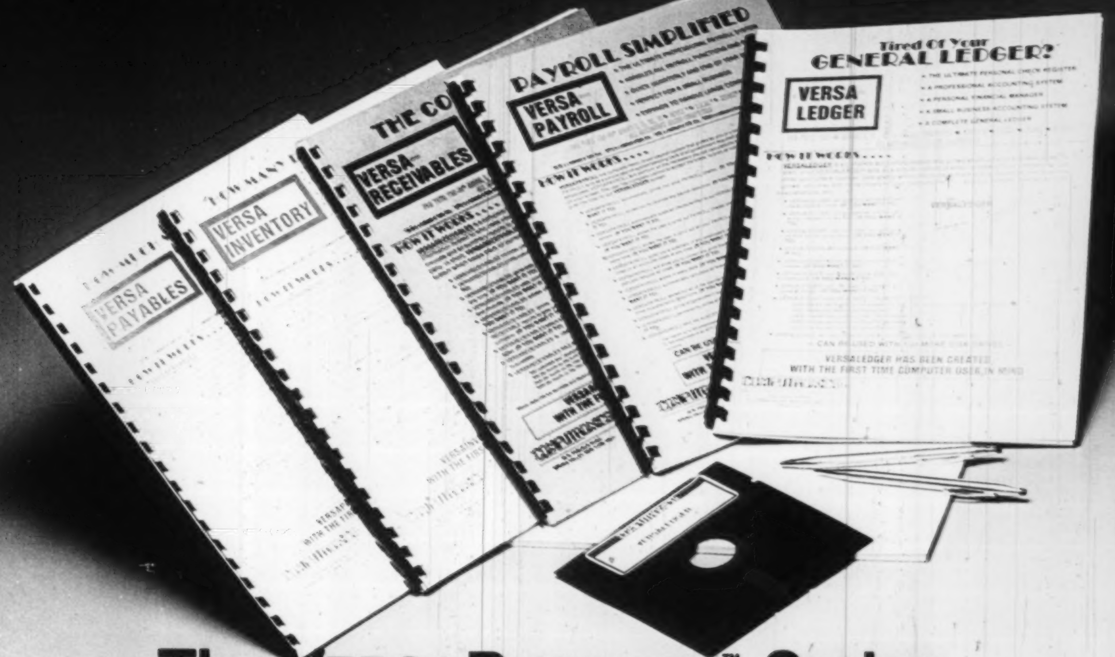

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